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ABSTRACT

This report evaluates the effectiveness and efficiency of individualized instruction compared to conventional instruction. The report provides information concerning relationships among student ability, school performance, and fleet supervisory ratings for 5,811 graduates of 19 Navy "A" schools and three pre-"A" school basic courses. The graduates received training under one of three different methods of instruction: self-paced, computer-managed, or group-paced. Significant relationships were found between student ability and school performance measures. Higher-ability students completed individualized courses in less time and received higher grades than lower-ability students; however, this relationship did not hold for conventional courses. Neither of these measures was significantly related to fleet supervisory ratings of training adequacy. Recommendations were made for resolution of problems associated with the measurement of training effectiveness. (Author/KC)

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Technical Report 136

RELATIONSHIPS AMONG STUDENT ABILITY, SCHOOL PERFORMANCE, AND FLEET SUPERVISOR RATINGS FOR NAVY "A" SCHOOL GRADUATES

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November 1982

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This is the second in a series of reports that evaluate the effectiveness and efficiency of individualized instruction compared to conventional instruction. The present report provides information concerning relationships among student ability, school performance, and fleet supervisor ratings for 5,811 graduates of 19 Navy "A" schools and 3 pre-"A" school basic courses. The graduates received training under one of three different

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methods of instruction: self-paced, computer-managed, or group-paced. Significant relationships were found between student ability and school performance measures. Neither of these measures was significantly related to fleet supervisor ratings of training adequacy.

Recommendations are presented for resolution of problems associated with the measurement of training effectiveness.

Technical Report 136

TABLE OF CONTENTS

Section Page

SUMMARY OF THE STUDY.......... 7

I INTRODUCTION.......... 9

Purpose of the Present Study.......... 10
Organization of the Report.......... 10

II TECHNICAL APPROACH.......... 12

Study Variables.......... 12

  Predictor Variables.......... 12

    General Ability Level.......... 12
    Specific Skill Level.......... 12

  Criterion Variables.......... 13

    Training Effectiveness Measures.......... 13
    Training Efficiency Measure.......... 15

  Other Study Variables.......... 15

    Type Training Task.......... 15
    Training Costs.......... 15

Study Samples.......... 15

  Course Samples.......... 15
  Graduate Samples.......... 17

School Interviews.......... 17
Data Collection.......... 17
Statistical Model Used in Data Analysis.......... 17

III RESULTS.......... 20

School Descriptions.......... 20

  Descriptive Statistics.......... 20

    Individualized "A" Schools (Self-Paced and Computer-Managed Instruction).......... 20

      Ability Characteristics.......... 20
      Training Tasks.......... 21

TABLE OF CONTENTS (continued)

Section Page

School Grades.............................. 21
Training Time.............................. 21
Training Cost.............................. 21
Overall TAS Ratings.......................... 21
Task-Specific TAS Ratings.................... 21

Conventional "A" Schools (Group-Paced Instruction).................................. 21

Ability Characteristics...................... 22
Training Tasks............................. 22
School Grades.............................. 22
Training Time.............................. 22
Training Cost.............................. 22
Overall TAS Ratings.......................... 22
Task-Specific TAS Ratings.................... 22

Basic (Pre-"A") Schools (Computer-Managed Instruction).................................. 22

Ability Characteristics...................... 22
Training Tasks............................. 23
School Grades.............................. 23
Training Time.............................. 23
Training Cost.............................. 23
Overall TAS Ratings.......................... 23
Task-Specific TAS Ratings.................... 23

Interview Results.............................. 23

Purpose of Training.......................... 23
Organization of Training..................... 23
Performance Measurement...................... 24
Administration of Training................... 24
Attitudes.................................. 24

Regression Analyses................................ 48

IV DISCUSSION.................................... 51

Training Efficiency................................ 51
Training Effectiveness............................. 51

School Level.................................. 52
Fleet Setting................................. 52

TABLE OF CONTENTS (continued)

Section | Page

Intercorrelation of AFQT and ASVAB Selector Composite Scores 53

V CONCLUSIONS AND RECOMMENDATIONS 56

Conclusions 56
Recommendations 57

REFERENCES 59

APPENDIX A ASVAB Information 60

APPENDIX B ASVAB Selector Composite Subtest Information 63

APPENDIX C Generic Training Tasks 65

APPENDIX D Cost Data 67

APPENDIX E Courses Included in the Study 70

APPENDIX F Structured Interview Questionnaire 72

APPENDIX G Statistical Results of Regression Analyses 82

APPENDIX H Parametric and Nonparametric Correlations 104

LIST OF ILLUSTRATIONS

Figure | Page

D-1 Decision Outcome Matrix of Cost and Effectiveness Comparisons 68

LIST OF TABLES

Table | Page

1 Major Predictor and Criterion Variables 13

2 Example of Training Appraisal System (TAS) Questionnaire Items 14

3 Course Samples 16

4 Graduate Samples of "A" Schools 18

5 Descriptive Statistics of Predictor and Criterion Variables for the Individualized "A" Schools Included in the Study 25

6 Descriptive Statistics of Predictor and Criterion Variables for the Conventional "A" Schools Included in the Study 27

7 Descriptive Statistics of Predictor and Criterion Variables for the Basic Courses Included in the Study 29

8 School Information: Self-Paced Courses (AK, DK, TD, YN) 30

9 School Information: Self-Paced Courses (IM, MM1200 psi, MM600 psi, PN) 33

10 School Information: CMI Courses (EN, AD, RM Basics, PE Basics) 36

11 School Information: Conventional Courses (AE, ASE, AW) 39

12 School Information: Conventional Courses (EM, FTM, GMM) 42

13 School Information: Conventional Courses (RM-Sea, RM-Shore, SH) 45

14 Statistical Summary of Regression Analyses 49

LIST OF TABLES (continued)

Table		Page
15	Narrative Summary of Regression Analyses	50
16	Summary of Correlation Coefficients Between AFQT and ASVAB Selector Composite Scores of Graduates from Each of the "A" Schools Sampled	55
A-1	ASVAB Subtests	61
A-2	Pre-October 1980 AFQT Conversion: ASVAB Forms 6 and 7	62
B-1	ASVAB Selector Composites	64
C-1	Instructional Quality Inventory Content Types	66
D-1	Decision Outcome Matrix of Cost and Effectiveness Comparisons	68
E-1	Courses Included in the Study	71
G-1	Statistical Summary of Regression Findings	84
G-2	Significant Results from Regression Analyses of Criterion Variables for the AD Course	85
G-3	Significant Results from Regression Analyses of Criterion Variables for the AK Course	86
G-4	Significant Results from Regression Analyses of Criterion Variables for the DK Course	87
G-5	Significant Results from Regression Analyses of Criterion Variables for the EN Course	88
G-6	Significant Results from Regression Analyses of Criterion Variables for the PE-Basics-EN Course	89
G-7	Significant Results from Regression Analyses of Criterion Variables for the IM Course	90
G-8	Significant Results from Regression Analyses of Criterion Variables for the MM600 Course	91
G-9	Significant Results from Regression Analyses of Criterion Variables for the MM1200 Course	92
G-10	Significant Results from Regression Analyses of Criterion Variables for the PE-Basics-MM Course	93

LIST OF TABLES (continued)

Table		Page
G-11	Significant Results from Regression Analyses of Criterion Variables for the PN Course	94
G-12	Significant Results from Regression Analyses of Criterion Variables for the TD Course	95
G-13	Significant Results from Regression Analyses of Criterion Variables for the YN Course	95
G-14	Significant Results from Regression Analyses of Criterion Variables for the AE Course	96
G-15	Significant Results from Regression Analyses of Criterion Variables for the ASE Course	97
G-16	Significant Results from Regression Analyses of Criterion Variables for the AW Course	98
G-17	Significant Results from Regression Analyses of Criterion Variables for the EM Course	99
G-18	Significant Results from Regression Analyses of Criterion Variables for the FTM Course	100
G-19	Significant Results from Regression Analyses of Criterion Variables for the GMM Course	101
G-20	Significant Results from Regression Analyses of Criterion Variables for the RM-Sea Course	102
G-21	Significant Results from Regression Analyses of Criterion Variables for the RM-Shore Course	102
G-22	Significant Results from Regression Analyses of Criterion Variables for the RM-Basics Course	103
G-23	Significant Results from Regression Analyses of Criterion Variables for the SH Course	103
H-1	Parametric and Nonparametric Correlations Between Criterion and Predictor Variables by Methods of Instruction and Schools	105
H-2	Number of Significant Regression Coefficients, Parametric and Nonparametric Correlations per Number of Applicable Courses for Each Criterion Predictor Relationship by Method of Instruction	106

SUMMARY OF THE STUDY

The Training Analysis and Evaluation Group (TAEG) was tasked by the Chief of Naval Education and Training (CNET) to conduct a study to determine the relative effectiveness and efficiency of individualized instruction for different kinds of training tasks and ability levels of trainees. A series of reports document different, specific aspects of the TAEG program. The first report (Hall and Freda, 1982) presented evidence that differences in training effectiveness and efficiency measures were related to different instructional methods and, in turn, to different ability levels of trainees and types of training tasks. The conclusions were based on interschool analyses of individual graduate data grouped across 19 Navy "A" schools. The results were discussed in terms of their implications for groups of courses conducted under the general headings of individualized or conventional instruction, rather than for any specific course.

The present report is the second in the series. It provides information concerning specific courses conducted under individualized instruction (II) or conventional instruction (CI). The findings presented are based on intraschool analyses; i.e., analyses of data specific to each course addressed in the first report. Additionally, training effectiveness and efficiency information is provided for each of three basic computer-managed instruction courses.

The major purpose of the present effort was to determine the generalizability of the overall findings to each of the "A" schools and basic courses of interest. Another purpose was to determine how two measures of student ability (a general ability measure and a specific ability measure) were related to effectiveness/efficiency measures for particular individualized or conventional courses.

Two measures of training effectiveness and one measure of training efficiency were examined. Student end-of-course grades were used as an internal criterion of training effectiveness. Fleet supervisor ratings of the adequacy of training for identified school graduates were used as an external criterion of effectiveness. The training efficiency measure was student time-to-complete training. Two measures of graduate ability were used. Student general ability levels were represented by Armed Forces Qualification Test (AFQT) percentile scores. These were obtained by converting their Armed Services Vocational Aptitude Battery (ASVAB) test scores. The specific skill levels of graduates were obtained by forming selector composite scores from individual ASVAB subtest scores.

Of the 22 Navy schools examined, 19 were "A" schools and 3 were basic (pre-"A") courses. Thirteen of the courses were conducted using individualized instruction (eight were self-paced courses; five featured computer-managed instruction). The other nine courses were conducted under conventional, group-paced instruction.

A correlational approach was used to conduct the study. Record data were collected on 5,811 school graduates. The results of all statistical analyses performed on the data are summarized in two tables in section III of the report. The major findings and conclusions of the study are summarized below.

1. The inverse relationship between general ability and training time (i.e., higher ability being associated with shorter training time) observed from the interschool analyses was confirmed by the intraschool analyses for the majority of individualized courses examined. Higher ability graduates completed training in less time than lower ability graduates in 8 of the 13 individualized courses. There was no significant relationship between ability and training time for the remaining five individualized courses.

2. The previous finding that longer training times were associated with higher ability graduates in conventional courses was not confirmed at the individual course level. Higher ability graduates completed their courses in the same amount of time as lower ability graduates within four of the five conventional courses having variable course lengths. (Note that time variation occurs in conventional courses because of academic remediations.)

3. Higher ability (both AFQT and ASVAB selector composite scores) is related to higher grades consistently within individualized courses but inconsistently within conventional courses. Higher ability graduates received higher end-of-course grades in all of the seven individualized courses but in only three of the seven conventional courses that provided grades. These findings substantiate the results of the interschool analyses conducted across individualized and conventional courses.

4. Shorter training time is associated with higher grades within individualized and conventional courses. Graduates who spent less time in training received higher end-of-course grades than those with longer training times in six of the seven individualized courses, and in four of five conventional courses showing variable course lengths.

5. General ability (AFQT percentiles) and specific ability (ASVAB selector composite scores) predict training time and grades equally well for each of the II and CI courses studied. Neither general ability nor specific ability significantly predicted fleet supervisor (TAS) ratings. General ability and specific ability scores were highly intercorrelated in each of the II and CI courses sampled.

6. Only chance-level relationships were found between fleet supervisor ratings of school training adequacy and other available measures on school graduates. Specifically, for the courses examined, Training Appraisal System (TAS) ratings were not significantly related to end-of-course grades, time-to-complete training, graduate general ability levels, or graduate specific ability levels.

Recommendations are presented within the report concerning the resolution of problems associated with the measurement of training effectiveness.

SECTION I

INTRODUCTION

The Chief of Naval Education and Training (CNET) tasked[1] the Training Analysis and Evaluation Group (TAEG) to assess the effectiveness and efficiency of individualized instruction (II) relative to conventional instruction (CI). The tasking included a requirement to determine if any differences found among effectiveness/efficiency measures were further related to differing student ability levels and/or types of training tasks.

A series of reports document different aspects of the TAEG program. The first report of the series (Hall and Freda, 1982, hereafter referred to as TAEG 117) presented overall evidence that differences in training effectiveness and efficiency measures were related to different instructional methods, ability levels of trainees, and types of training tasks. The evidence was derived from analyses of data for 19 Navy "A" schools. Ten of the courses were conducted using II formats (eight were self-paced courses, two featured computer-managed instruction). The other nine courses were conducted under conventional, group-paced instruction. Selected findings and conclusions of the study (TAEG 117) are summarized below:

- Under individualized instruction, higher ability graduates completed training in less time than lower ability graduates.
- Under conventional instruction, higher ability graduates were in training longer than lower ability graduates.
- Higher ability graduates received higher end-of-course grades than lower ability graduates under individualized instruction. However, end-of-course grades for conventionally-trained graduates were equivalent across all ability levels.
- Fleet supervisor ratings of training adequacy were not significantly related to general ability, end-of-course grades or training time.

Note that the findings listed above pertained to the two groups of courses (i.e., a CI group and an II group) rather than to any individual course within a group.

The present report is the second in the series. It provides information concerning the individual courses conducted under II or CI. The findings presented are based on intraschool analyses; i.e., analyses of data specific to each course addressed in the first report. Additionally, training effectiveness and efficiency information is provided for each of three basic computer-managed instruction courses.

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[1] CNET ltr Code N-53 of 22 April 1980.

Subsequent reports in the series will present:

- an analysis of relationships among training effectiveness/efficiency measures for courses with highly similar content but which were taught at different geographical locations and under different instructional methods

- a selected review of the literature concerning interrelationships among ability measures, instructional methods, and generic training tasks

- comparative analyses of differences in generic task classifications of school-trained skill and knowledge items made:

  .. by two different groups of raters (school subject matter experts (SMEs) and research personnel) using the same classification system

  .. using two different classification systems

- an executive summary of the TAEG program.

PURPOSE OF THE PRESENT STUDY

The purpose of the present effort was to determine if the interrelationships among student ability, school performance, and fleet supervisor ratings observed across schools also occur at the individual course level. Another purpose was to determine how two different measures of student ability (a general ability measure and a specific ability measure) were related to effectiveness/efficiency measures in specific individualized or conventional courses.

Three major questions were addressed:

- How many of the 19 "A" schools contributed to the overall differences in training effectiveness/efficiency observed previously in the interschool analyses?

- Do the overall differences observed in the interschool analyses hold for Basic (pre-"A" school) courses?

- Do specific skill levels (ASVAB composite scores) of the graduates of each of the 19 "A" schools predict training effectiveness/efficiency to the same extent as general ability levels (AFQT) of the same graduates?

ORGANIZATION OF THE REPORT

The remainder of this report is presented in four sections and eight appendices. Section II presents the technical approach of the study. Section III presents information describing the schools studied and the results of the within-school data analyses. A discussion and interpretation of the results are provided in section IV. Conclusions and recommendations are presented in section V.

Appendix A contains information concerning the Armed Services Vocational Aptitude Battery (ASVAB). Appendix B presents ASVAB selector composite subtest information used to select personnel for entry into specific "A" schools. ASVAB scores were used as measures of student ability for the present study. Appendix C contains examples of generic training tasks. Derivation of training cost data is explained in appendix D. The schools studied during the work program are identified in appendix E. Appendix F presents structured-interview questions asked of SMEs at each of the 19 enlisted "A" schools. Statistical results of regression data analyses are delineated in appendix G. Parametric and nonparametric correlations between variables studied are presented in appendix H.

SECTION II

TECHNICAL APPROACH

A correlational approach was employed to achieve the objectives of the study. This section presents the details of the approach. Initially, the variables selected for examination are discussed. Subsequent subsections provide descriptions of the samples of courses and graduates, interviews conducted at the schools, data collection and analysis procedures, and the statistical model employed to analyze data.

STUDY VARIABLES

Five major variables, two predictor and three criterion variables,[2] were examined. The variable names, the measures of the variables, and the sources of data on the variables are shown in table 1. Further discussions of these variables are provided below.

PREDICTOR VARIABLES. The predictor variables were general ability level and specific skill level.[3]

General Ability Level. General ability levels of trainees were represented by Armed Forces Qualification Test (AFQT) percentile equivalent scores. The AFQT percentile score (pre-October 1980) is derived from raw scores on 3 of the 12 subtests contained in the Armed Services Vocational Aptitude Battery (ASVAB). The ASVAB is routinely administered to all armed services enlistees. The AFQT score is used to determine enlistment eligibility. Appendix A describes the ASVAB and the methods used to derive the AFQT score.

Specific Skill Level. Scores obtained on different ASVAB subtests are combined to form a composite score to select personnel for a specific "A" school. Test scores derived from the ASVAB selector composites were used to reflect specific skill levels. Appendix B presents ASVAB selector composite information for each of the schools analyzed in the present study.

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[2] A predictor variable is one in which a change in its value can forecast a change in the value of another variable (criterion). Predictor variables are also called independent variables; criterion variables are called dependent variables. Precise definitions of these terms may be found in various statistical sources, for example, Finn (1974) and Cohen and Cohen (1975).

[3] Note that training time and end-of-course grades were also used as predictor variables, as well as criterion variables, depending on what point in time the measures were collected relative to the other predictor and criterion variables used in the analyses. See Cohen and Cohen (1975) for discussion of using a measure as a predictor and criterion variable in a hierarchical regression model.

TABLE 1. MAJOR PREDICTOR AND CRITERION VARIABLES

VARIABLE	MEASURES	SOURCE
PREDICTOR		
General Ability	AFQT	CNET 015
Specific Skill	ASVAB School Composite	TPCs, NPRDC
CRITERION		
EFFECTIVENESS		
End-of-Course Grades	Final Grades	School Records (SP + GP), CNTECHTRA (CMI)
Training Adequacy Ratings	TAS Ratings (1 to 5 Scale)	TAS (CNET)
EFFICIENCY		
Time-to-Complete	Contact Hours	CNTECHTRA (CMI), School Records, SMEs, NITRAS (SP + GP)

Notes:

TAS - Training Appraisal System
TPCs - Training Program Coordinators
NPRDC - Navy Personnel Research and Development Center
CNTECHTRA - Chief of Naval Technical Training
NITRAS - Navy Integrated Training Resources and Administrative System

CRITERION VARIABLES. Two measures of training effectiveness and one measure of training efficiency were used as criterion variables. The effectiveness measures were end-of-course grades and fleet supervisor ratings of school training adequacy. The efficiency measure was time-to-complete training.

Training Effectiveness Measures. End-of-course grades, which reflect how well graduates perform in school, were used as an internal measure of training effectiveness. Fleet supervisor ratings, which reflected training adequacy based on graduate job peformance, were used as an external measure of course effectiveness.

The internal measures of end-of-course grades represented the average percent correct obtained by a graduate on items tested in the school. End-of-course grades obtained from the schools were based on either combinations of scores from module/lesson examinations administered during the course of training, or on comprehensive examinations administered at the end of training.

The external measures consisted of fleet supervisor ratings of the adequacy of school training for particular tasks which graduates are expected to perform on the job. Fleet supervisors' ratings of training adequacy on identified courses and graduates were available at CNET in the Naval Education and Training Command (NAVEDTRACOM) Training Appraisal System (TAS) data base. The CNET Special Assistant for Training Appraisal (CNET 015) routinely collects feedback data, via mailout questionnaires, from first-level fleet supervisors of recent (e.g., 3 to 6 months on the job) technical school graduates. Random samples of graduates are drawn from the total pool of course graduates during a given time frame.

Table 2 shows the types of TAS questionnaire items used to collect training adequacy data. Fleet supervisors rate on a 5-point scale the adequacy of school training for an identified course graduate. Training adequacy judgments are made for a number of specific tasks for which a given technical school provided training. The task statements listed on a feedback questionnaire are currently prepared by technical training staff for a given course. The statements are based on the learning objectives of that course and, thus, reflect specific skills and knowledges taught.

TABLE 2. EXAMPLE OF TRAINING APPRAISAL SYSTEM (TAS) QUESTIONNAIRE ITEMS

Adequacy of School Training:
Circle One Number for Each Item Listed

1. Unsatisfactory
2. Less Than Adequate
3. Adequate
4. More Than Adequate
5. Much More Than Adequate

Skill or Knowledge Item					
Identify Purposes and Organization of Personnel Qualification Standards	1	2	3	4	5
Recognize Symptoms of Severe Electric Shock	1	2	3	4	5
Operate Ship's Store Cash Register	1	2	3	4	5
Develop Drawing Layout for Sheet Metal Projects	1	2	3	4	5
Troubleshoot Magnetic Amplifiers	1	2	3	4	5

Training Efficiency Measure. Student time (contact hours of instruction) to complete a course was used as a measure of training efficiency. Student course completion times were available for individualized courses from CMI files and for self-paced courses, from class records at the schools. Completion times for the conventional courses were obtained from the schools and from CNET computer files.

OTHER STUDY VARIABLES. For the interschool analyses (TAEG 117), two other major variables were also assessed: type training task and costs to produce graduates. These variables were not used as either predictor or criterion variables in the present intraschool study because their values are fixed for any given course. Consequently, there was no variance that could be assessed from individual graduate data to derive conclusions about the individual schools based on these measures. The variables are explained here, however, since it is instructive to compare different schools on these measures. These comparisons are provided in section III of this report.

Type Training Task. Type training task refers to the composition, or nature, of the instructional content of a course. For the TAEG project, the content of each specific course examined was reduced to five generic types of training tasks: facts, categories, procedures, rules, and principles. A group of SMEs at each school classified each knowledge/skill item of the TAS questionnaires (for each school) into one of the five generic training tasks. This procedure equated the different course contents to a common base which, in turn, permitted quantitative comparisons to be made between different courses. The methods and procedures used to categorize instructional content into generic task classifications are fully explained in TAEG 117. Further information about the generic tasks is given in appendix C of the present report.

Training Costs. For the interschool analysis (TAEG 117), a cost measure, referred to as Cost to Produce One Graduate, was derived and used to permit relative cost comparisons to be made between different courses. Information concerning these relative instructional costs for each course is provided in section III. Information concerning the derivation of the cost measure is given in appendix D.

STUDY SAMPLES

Two sets of samples were used in the study: (1) courses taught under each of the basic methods of instruction and (2) graduates of these courses.

COURSE SAMPLES. All courses selected for the study were classified as A1-level. (A1-level courses provide skill and knowledge training for entry level Navy jobs.) A principal criterion used for course selection was the current availability of TAS data.

The schools involved trained students under one of two basic methods: individualized instruction or conventional instruction. Individualized instruction involved self-paced (SP; frequently referred to as IMI for instructor-managed instruction) and computer-managed courses (CMI). Conventional instruction involved group-paced (GP) classroom instruction.

Data from 19 A1-level courses were included in the intraschool (within-school) analyses. Eight self-paced and two CMI courses were in the II group. Nine group-paced courses were in the CI group. In addition, data were obtained from basic CMI courses. Graduates of the RM Sea "A" school and the RM Shore "A" school previously attended the RM Basics course. Their records were obtained from CNTECHTRA CMI files and used in the data analyses. Similarly, graduates of the EN, MM600 psi, and MM1200 psi schools attended the Propulsion Engineering (PE) Basics course prior to entry into their respective "A" schools. Their records were also obtained from CMI files. The course samples are shown in table 3. The complete names of the courses and school locations are provided in appendix E.

TABLE 3. COURSE SAMPLES

Self-Paced	Group-Paced
Machinist's Mate, 600 psi[1] (MM600)	Radioman, Sea[2] (RM-Sea)
Machinist's Mate, 1200 psi[1] (MM1200)	Radioman, Shore[2] (RM-Shore)
Instrumentman (IM)	Electrician's Mate (EM)
Training Device Repairman (TD)	Fire Control Technician, Missile (FTM)
Personnelman (PN)	Gunner's Mate, Missile (GMM)
Yeoman (YN)	Aviation Support Equipment Technician (ASE)
Disbursing Clerk (DK)	Aviation Anti-submarine Warfare (ASW) Operator (AW)
Aviation Storekeeper (AK)	Ship's Serviceman (SH)
CMI	Aviation Electrician's Mate (AE)
Engineman[1] (EN)	
Aviation Machinist's Mate (AD)	

[1] Also obtained data from CMI PE basics course.
[2] Also obtained data from CMI RM basics course.

GRADUATE SAMPLES. As mentioned previously, the names of school graduates who were included in the TAS graduate samples were obtained from CNET. Table 4 shows the numbers of graduates for each school for whom data were obtained. A total of 5,811 graduate records were examined for the schools studied (4,006 for the schools shown in the table plus 1,805 records for these same school graduates who first attended CMI basic courses before entering an "A" school). The table also shows the method of instruction used at each school and the inclusive graduation dates for the students. The numbers of graduates of each school for whom data were available on variables of interest are also shown. Note that some individualized courses provide end-of-course grades while others do not.

SCHOOL INTERVIEWS

Subject matter experts were interviewed at each school to obtain information about course purposes, and organization, student performance measures, administration, and attitudes of the staff toward instructional mode. A copy of the interview protocol used is shown in appendix F. Descriptive information obtained from these interviews is summarized in section III of this report.

DATA COLLECTION

The names, graduation dates, and social security numbers of school graduates were obtained from CNET TAS files. Visits were made to technical schools between August and November 1980 to obtain data on course graduates and to interview SMEs. At the schools, graduate record data were manually entered on worksheet forms for subsequent entry into computer files. Data recording was accomplished either by TAEG project staff or school SMEs functioning under general TAEG supervision. Information recorded consisted principally of end-of-course grades and time-to-complete training. Where available, the numbers of academic remediations and setbacks, and numbers of additional hours of instruction required were also recorded.

Training adequacy ratings were obtained from the CNET TAS data base. The data included the fleet supervisors' ratings for each graduate (i.e., 1, 2, 3, 4, or 5) on each skill/knowledge item of the course feedback questionnaire. The 12 ASVAB subtest scores of each graduate were also obtained from the CNET TAS data base (or the student master file when necessary). All data collection was completed by mid-1981.

STATISTICAL MODEL USED IN DATA ANALYSIS

A partial hierarchical regression model was employed to examine the effect of each set of predictors on the criterion variables (Cohen & Cohen, 1975; Kim & Kohout, 1975). This model allowed a unique partitioning of the total variance of each criterion to be accounted for by each subset of predictors entered into the regression equation. The use of a multiple regression technique is consonant with current methodological approaches in investigating the effects of ability characteristics and instructional variables (aptitude-treatment interactions) on training effectiveness/efficiency (e.g., Cronbach & Snow, 1977). For the present study, predictor variables were

TABLE 4. GRADUATE SAMPLES OF "A" SCHOOLS*

COURSE	TYPE	GRADUATING DATES	ORIGINAL SAMPLE SIZE	ASVAB	TIME-TO-COMPLETE	END-OF-COURSE GRADE	RATINGS ON TAS ITEMS
AK	SP	10/79-4/80	254	241	231	NONE	170
DK	SP	8/79-2/80	110	107	110	110	79
IM	SP	10/79-4/80	18	18	17	16	15
MM600[1]**	SP	10/78-3/79	374	372	284	282	138
MM1200[1]**	SP	9/78-3/79	204	203	176	176	124
PN	SP	11/78-5/79	84	74	69	NONE	65
TD	SP	1/79-7/79	185	179	185	NONE	162
YN	SP	11/78-5/79	222	208	211	NONE	174
AD	CMI	10/79-4/80	464	450	454	464	98
EN[2]	CMI	3/79-6/79	359	356	349	244	192
AE	GP	3/79-5/79	90	86	90	90	54
ASE	GP	8/79-2/80	36	29	36	36	29
AW	GP	1/79-7/79	47	42	45	45	35
EM	GP	8/78-2/79	362	354	349	306	262
FTM	GP	10/78-4/79	77	77	66	66	34
GMM	GP	7/79-12/79	47	47	47	47	21
RM-Sea[3]	GP	2/79-12/79	496	495	487	NONE	369
RM-Shore[3]	GP	3/79-8/79	400	397	400	NONE	396
SH	GP	10/79-3/80	177	176	177	177	132
Subtotals:	SP	10/78-4/80	1451	1402	1283	584	927
	CMI	3/79-4/80	823	806	803	708	290
	GP	8/78-4/80	1732	1703	1697	767	1332
Total		8/78-4/80	4006	3911	3783	2059	2549

[1] CMI data from Propulsion Engineering (PE) Basics obtained from CNTECHTRA (CDP 6262; 552 records)

[2] CMI data from PE Basics obtained from CNTECHTRA (CDP 6261; 359 records)

[3] CMI data from RM Basics obtained from CNTECHTRA (CDP 6144; 894 records)

*The cell entries under each of the variables are the number of graduates for whom data were available.

**1978 student training records obtained from National Archives via CNTECHTRA and PE School.

considered statistically significant and relevant if they met an acceptable level of significance ($p < .05$) and incremented the amount of variance explained on each criterion variable by at least 2 percent. (See TAEG 117 for specification of the hierarchical regression model used in the study.)

SECTION III

RESULTS

The results of the data analyses are presented in this section. Information derived from summary statistics and obtained from structured interviews is presented first. Regression analyses of quantitative relationships among the predictor and criterion measures are then summarized for graduates within each school. Appendix G presents the results of the regression analyses of the data; appendix H contains the zero-order and two nonparametric correlations of variables used in the regression analyses.

SCHOOL DESCRIPTIONS

Descriptive statistics concerning seven predictor and nine criterion variables for each of the schools are summarized below. Also presented are the results of structured interviews conducted at each of the schools.

DESCRIPTIVE STATISTICS. The means ($\overline{X}$), standard deviations (SD), and sample sizes (N) of seven predictor and nine criterion variables for each of the schools in the study are presented in tables 5, 6, and 7. Table 5 summarizes descriptive statistics of eight self-paced "A" schools and two computer-managed instruction "A" schools. Table 6 summarizes descriptive statistics of nine group-paced "A" schools; table 7 summarizes descriptive statistics of three computer managed basic courses. Note that only two basic schools were examined (RM and PE Basics); however, graduates of the PE Basic school subsequently entered two different "A" schools (MM and EN). Thus, summary statistics are presented for three different groupings of "A" school graduates: RM, PE (MM), and PE (EN).

Each of the three tables shows the average of the graduate's general ability level (AFQT) and the average specific ability level (ASVAB selector composite) for each course. The relative amount (percentage) of a course's content that reflects a particular type of generic task (i.e., fact, category, procedure, rule, or principle) is also shown. For each course, the graduates' average end-of-course grades (where applicable) are given. The average fleet supervisor rating (overall training appraisal system (TAS)), computed over all graduates and all questionnaire items, is shown for each course. Average supervisor ratings (for graduates) in each of the five generic tasks are also presented. Additionally, average student time (in contact hours) to complete each particular course and the dollar cost to train each graduate are given. The numbers immediately below the course identifier (e.g., AK/6522) comprise the Course Data Processing (CDP) number. A CDP uniquely identifies a course and its location. The above information is presented for each school grouped under method of instruction.

__Individualized "A" Schools (Self-Paced and Computer-Managed Instruction)__. Summary descriptions of predictor and criterion variables for the individualized "A" schools (table 5) are provided below.

Ability Characteristics. The average AFQT percentile scores for all of the individualized courses were above the standardized norm (i.e., 50). Graduates of the TD and MM600 courses had the highest average AFQT scores (79 = Mental Category 2). The average graduates' ASVAB selector composite scores for all individualized courses were above the minimum cutoff levels required for entry into each of the schools.

Training Tasks. The majority of tasks taught in 7 (AK, MM600, MM1200, PN, YN, AD, EN) of the 10 individualized courses were procedure tasks. The majority of tasks taught in two courses (DK and TD) were rule tasks, while principle and procedure tasks (combined) formed the majority of tasks taught in the IM course.

School Grades. End-of-course grades were provided in 6 (DK, IM, MM600, MM1200, AD, EN) of the 10 individualized courses. The average end-of-course grade ranged from 82 to 93 for the six courses. For three of the courses (DK, IM, and AD), grades were in the 80s. Graduates of the remaining three courses (MM600, MM1200, and EN) received grades in the 90s.

Training Time. For 5 (MM1200, PN, TD, YN, AD) of the 10 individualized courses, average student contact hours to complete their respective courses were in the range of 100 to 200 hours. Graduates of two of the individualized courses (EN and MM600) were in the 70 to 90 hours range for average course completion, while graduates of the two other courses (AK and DK) had a range of 200 to 300 hours. The average course completion time for the IM course was 600 hours.

Training Cost. For 3 (EN, MM600, MM1200) of the 10 individualized courses, the average cost was between $1,500 and $1,800 to produce one graduate per course session. For four of the courses (AK, DK, TD, and AD), the average cost was between $2,500 and $3,000. For two other courses (PN and YN), the average graduate training cost ranged from $3,100 and $3,600. The average training cost of the IM course was $6,400.

Overall TAS Ratings. On a five-point scale, the average overall fleet supervisor ratings of training adequacy for 8 (DK, IM, MM600, MM1200, PN, TD, YN, EN) of the 10 courses ranged from 2.6 to 3.0. The average overall TAS ratings were above 3.0 for graduates of the AK and AD courses.

Task-Specific TAS Ratings. As shown in table 5, average TAS ratings were very similar for the five generic tasks in 4 (AK, YN, AD, and EN) of the 10 individualized courses. The average TAS ratings for all five generic tasks for the MM1200 and PN courses were similar. However, the respective task-specific TAS ratings within the remaining four courses (DK, IM, MM600, and TD) differed. Within the DK course, TAS ratings for procedure task items were higher than for category task items; in the IM course, TAS ratings were higher for category task items than for principle task items; and in the TD course, TAS ratings were higher for rule task items than for category task items.

Conventional "A" Schools (Group-Paced Instruction). Table 6 presents descriptive statistics for the nine conventional "A" schools. Summary descriptions of the schools by predictor and criterion variables are provided below.

Ability Characteristics. The average AFQT percentile scores for all the conventional courses were above the standardized norm (50). Graduates of the FTM course had the highest average AFQT score (72 = Mental Category 2) of the group-paced courses. The average ASVAB selector composite scores for all conventional course graduates were above the minimum levels required for entry into each of the schools.

Training Tasks. The majority of tasks taught in five (AE, ASE, GMM, RM-Sea, RM-Shore) of the nine conventional courses were procedure tasks. The majority of tasks taught in one course (EM) were principle tasks, while no single generic task comprised more than 50 percent of the generic tasks taught in the remaining three courses (AW, FTM, SH).

School Grades. End-of-course grades were provided for graduates of seven (AE, ASE, AW, EM, FTM, GMM, SH) of the nine group-paced courses. Average grades ranged from 79 to 89 for these seven conventional courses. For three of the courses (EM, FTM, and GMM), end-of-course grades were in the upper 70s, while for the remaining four courses (AE, ASE, AW, and SH) grades were in the 80s. For the graduates of the RM-Sea and RM-Shore courses, grades were recorded only as satisfactory/unsatisfactory.

Training Time. For seven (AE, ASE, AW, EM, FTM, GMM, SH) of the nine group-paced courses, average (if there were variable course lengths for graduates within a course) or fixed course completion times were in the 200 to 400 contact hours range. For the remaining two courses (RM-Sea and RM-Shore), reported course completion times were in the 70 to 100 contact hours range.

Training Cost. Training costs for the RM-Sea and RM-Shore courses were between $600 and $1,400 to produce one graduate. For the EM and SH courses, training costs were between $2,000 and $3,000 per graduate. For four of the remaining courses (AE, ASE, FTM, and GMM) training costs were between $3,000 and $4,000 per graduate. For the remaining course (AW), the average training cost was $7,000 to produce one graduate.

Overall TAS Ratings. The average overall TAS ratings for the nine group-paced courses ranged from 2.5 to 3.2. The lowest average rating was assigned to RM-Sea graduates and the highest to SH graduates.

Task-Specific TAS Ratings. The average TAS ratings were similar for all five generic tasks in four (AE, ASE, EM, and SH) of the nine conventional courses (table 6). Within the remaining five courses (AW, FTM, GMM, RM-Sea, and RM-Shore), their respective task-specific TAS ratings differed.

Basic (Pre-"A") Schools (Computer-Managed Instruction). Table 7 presents descriptive statistics for three basic, computer-managed instruction courses. Summary descriptions of the schools by predictor and criterion variables are provided below.

Ability Characteristics. The average AFQT percentile and ASVAB selector composite scores were previously presented in table 5 for the MM and EN graduates, and in table 6 for the RM graduates. Propulsion Engineering (PE) Basics is a prerequisite course for the EN, MM600, and MM1200 "A" schools. Radioman (RM) Basics is a prerequisite course for the RM-Sea and RM-Shore "A" schools.

Training Tasks. Training task information was available for two of the three basic courses. The majority of tasks taught in the RM-Basics and PE-Basics (MM) courses were procedure tasks. In the RM-Basics course, a substantial amount of fact and category tasks were also taught, while in the PE-Basics course (MM), a substantial amount of principle tasks were also taught.

School Grades. End-of-course grades were provided only for the PE-Basics (MM1200 and MM600) course (average grade of 92).

Training Time. For the PE-Basics (EN) and PE-Basics (MM1200 and MM600) courses, average student contact hours to complete the respective course were between 90 and 105 hours. An average course completion time of 244 student contact hours was reported for the RM-Basics course.

Training Cost. For the PE-Basics (EN) and PE-Basics (MM1200 and MM600) courses, average training costs were in the range of $1,100 to $1,500 to produce one graduate. The average training cost to produce one graduate in the RM-Basics course was $2,838.

Overall TAS Ratings. The average overall fleet supervisor ratings of training adequacy for the RM-Basics and PE-Basics (MM1200 and MM600) courses ranged between 2.5 and 2.9, respectively.

Task-Specific TAS Ratings. The average TAS ratings were approximately equal for all five generic tasks within the two courses (RM-Basics and PE-Basics (MM1200 and MM600)) that provided data from which task-specific ratings could be derived.

INTERVIEW RESULTS. Tables 8 through 13 present information (for each course) obtained from interviews (see appendix F) of SMEs at schools included in the study. A summary of the SME responses across courses is presented below by each area covered in the interview.

Purpose of Training. The purpose of the "A" schools sampled is to train students in basic procedural, maintenance, operational, and/or administrative requirements of their specialties (ratings). A key concept of "A" school training is to provide basic understanding of, and familiarization with, job requirements through information presented in the courses. From the point of view of the SMEs interviewed, the mission of the "A" schools is to produce graduates who have attained elemental knowledges and skills which are required for further development through on-the-job training in their first duty assignment. According to school SMEs, this view may conflict with that of fleet recipients of "A" school graduates who may expect the schools to provide at least "apprentice-trained" graduates possessing job-entry level skills who are immediately qualified to perform certain job duties.

Organization of Training. Training content, at all schools, was typically organized by major topic areas that were presented as modules or unit blocks. The topics were delivered in a fixed sequence, but the individual lessons contained within each topic area varied in length and in sequence presentation per class session. The designated method of instruction (i.e., SP, GP, CMI) for a particular course pertained primarily to the delivery of information/theory in the course. Laboratory/hands-on aspects of a course typically involved training students with equipment/simulators and working within a general time frame for completion of the laboratory tasks. The media used to teach students ranged from audiovisual materials to mock-ups, training devices, simulators, and actual equipment.

Performance Measurement. Multiple choice tests, written quizzes, laboratory hands-on tests, achievement on practical problems, and homework represented the majority of assessment techniques used to measure student achievement. When available, final course grades were computed in various ways. End-of-course grades were derived either from simple or from weighted averages of all tests, or were based on a single comprehensive end-of-course examination. In some instances, the final course grade was given simply as satisfactory or unsatisfactory. This determination was made by instructor observation of student performance. When class standing was computed in a particular course, student rank was based on final course grade, and/or time-to-complete the course.

Administration of Training. Approximately one-half of the courses studied have prerequisite courses in the form of basic, fundamental, or "A" school phase 1 courses. The majority of students attending the courses came from recruit training commands (RTCs) with a small percentage being fleet returnees, those from the "JOBS" program, or reservists. Most school graduates were immediately assigned to fleet duty billets after completing their courses. Some graduates continued into another phase of the same course or into advanced courses before reporting to fleet duty.

The time interval between a student's arrival and starting a course ranged from 1 to 30 days with a typical wait of less than 7 days for the majority of courses. The time interval between a student's graduation and departure to the next duty station ranged from 1 to 15 days, with a typical delay of less than 2 days for the majority of courses (not counting 14 days leave time).

At most schools, remediation procedures required the student to review the failed material, take a retest, and/or receive tutoring/counseling from an instructor. The instructor, learning center supervisor, or Academic Review Board (ARB) determined the criteria for, and extent of, student remediation. The ARB decided whether a student should be set back within a course. Setbacks typically occurred when a student consistently failed remediated tests. The TAEG found that official documentation of remediation and of setback hours in the student records was inconsistent or difficult to separate out from total contact hours across the majority of the schools sampled.

Attitudes. The majority of the SMEs responding to the attitude questions indicated that GP instruction would be (or is) more effective in fulfilling the purpose of the course than SP instruction. SMEs at SP and CMI schools were equally divided over the relative effectiveness of GP and SP, while all the SMEs at GP schools stated that the GP mode was effective. Similarly, the majority of the SMEs interviewed at the SP and GP schools favored group-pacing over self-pacing in overall training effectiveness.

TABLE 5. DESCRIPTIVE STATISTICS OF PREDICTOR AND CRITERION VARIABLES FOR THE INDIVIDUALIZED "A" SCHOOLS INCLUDED IN THE STUDY

	SELF-PACED COURSES														
	AK 6522			DK 6061			IM 6046			MM600 6493			MM1200 6492		
PREDICTORS	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N
AFQT (Percentile Score)	60.93	12.09	241	63.96	13.60	107	57.39	16.54	18	79.65	14.66	372	66.25	18.38	203
ASVAR COMPOSITE (Navy Standard Score)	109.65	7.62	240	111.90	10.34	108	165.65	12.66	17	118.15	10.30	360	111.02	13.33	201
FACT (%)	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
CATEGORY (%)	3.33	0.00	254	6.00	0.00	110	0.00	0.00	N/A	15.38	0.00	374	13.33	0.00	204
PROCEDURE (%)	66.66	0.00	254	16.00	0.00	110	44.82	0.00	18	69.23	0.00	374	66.66	0.00	204
RULE (%)	30.00	0.00	254	78.00	0.00	110	8.62	0.00	18	0.00	0.00	N/A	0.00	0.00	N/A
PRINCIPLE (%)	0.00	0.00	N/A	0.00	0.00	N/A	46.55	0.00	18	15.38	0.00	374	20.00	0.00	204
CRITERIA															
END-OF-COURSE GRADE (% CORRECT)	N/A	N/A	N/A	86.08	4.89	110	82.67	6.18	16	93.31	4.43	282	90.60	4.61	176
OVERALL TRAINING APPRAISAL SYSTEM (TAS) RATING (5pt Scale)	3.21	0.73	168	2.92	0.64	78	2.85	0.37	15	2.86	0.70	129	2.81	0.69	109
FACT TAS RATING (5pt Scale)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CATEGORY TAS RATING (5pt Scale)	3.41	0.88	138	2.28	0.71	45	N/A	N/A	N/A	3.08	0.74	98	2.96	0.68	78
PROCEDURE TAS RATING (5pt Scale)	3.20	0.70	165	3.04	0.71	74	2.89	0.39	15	2.78	0.70	125	2.80	0.74	106
RULE TAS RATING (5pt Scale)	3.23	0.78	155	2.91	0.65	78	3.03	0.65	13	N/A	N/A	N/A	N/A	N/A	N/A
PRINCIPLE TAS RATING (5pt Scale)	N/A	N/A	N/A	N/A	N/A	N/A	2.76	0.44	15	2.75	0.84	120	2.73	0.82	104
TIME-TO-COMPLETE THE COURSE (HRS)	206.50	46.33	231	281.37	47.01	110	629.31	127.33	17	91.92	38.86	284	139.57	47.39	176
COST TO PRODUCE ONE GRADUATE($)	2577.54	0.00	254	2968.66	0.00	110	6475.95	0.00	18	1699.20	0.00	374	1839.75	0.00	204

NOTES: $\bar{X}$ = Mean.
SD = Standard deviation.
N = Sample size.
N/A = Data not available, or applicable.

TABLE 5. DESCRIPTIVE STATISTICS OF PREDICTOR AND CRITERION VARIABLES FOR THE INDIVIDUALIZED "A" SCHOOLS INCLUDED IN THE STUDY (continued)

	SELF-PACED COURSES									COMPUTER-MANAGED INSTRUCTION					
	PN 6102			TD 6521			YN 6057			AD 6501			EN 6487		
PREDICTORS	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N
AFQT (Percentile Score)	63.26	13.12	74	79.82	13.65	179	51.59	14.23	208	50.94	13.64	450	57.29	13.94	356
ASVAB COMPOSITE (Navy Standard Score)	112.73	10.10	74	181.49	11.20	165	166.53	10.63	211	207.78	18.48	451	108.72	10.72	352
FACT (%)	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	4.76	0.00	464	0.00	0.00	N/A
CATEGORY (%)	0.00	0.00	N/A	8.33	0.00	185	4.16	0.00	222	0.00	0.00	N/A	15.62	0.00	359
PROCEDURE (%)	76.92	0.00	84	12.50	0.00	185	87.50	0.00	222	85.71	0.00	464	84.37	0.00	359
RULE (%)	23.07	0.00	84	70.83	0.00	185	8.33	0.00	222	9.52	0.00	464	0.00	0.00	N/A
PRINCIPLE (%)	0.00	0.00	N/A	8.33	0.00	185	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
CRITERIA															
END-OF-COURSE GRADE (% CORRECT)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	83.08	7.65	453	90.78	6.84	239
OVERALL TRAINING APPRAISAL SYSTEM (TAS) RATING (5pt Scale)	2.91	0.57	65	2.66	0.62	162	2.88	0.73	173	3.01	0.58	97	2.93	0.56	190
FACT TAS RATING (5pt Scale)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.99	0.68	68	N/A	N/A	N/A
CATEGORY TAS RATING (5pt Scale)	N/A	N/A	N/A	2.33	0.71	89	2.88	0.81	160	N/A	N/A	N/A	2.98	0.62	190
PROCEDURE TAS RATING (5pt Scale)	2.97	0.60	65	2.48	0.72	120	2.89	0.74	172	3.01	0.58	97	2.92	0.56	190
RULE TAS RATING (5pt Scale)	2.76	0.61	65	2.74	0.63	161	2.85	0.88	163	3.07	0.84	54	N/A	N/A	N/A
PRINCIPLE TAS RATING (5pt Scale)	N/A	N/A	N/A	2.33	0.91	145	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TIME-TO-COMPLETE THE COURSE (HRS)	150.04	57.74	69	145.43	25.89	185	171.30	50.66	211	190.12	50.46	454	73.84	13.45	348
COST TO PRODUCE ONE GRADUATE($)	3159.51	0.00	84	2629.44	0.00	185	3598.13	0.00	222	2488.32	0.00	464	1549.05	0.00	359

TABLE 6. DESCRIPTIVE STATISTICS OF PREDICTOR AND CRITERION VARIABLES FOR THE CONVENTIONAL "A" SCHOOLS INCLUDED IN THE STUDY

	GROUP-PACED COURSES														
	AE 6515			ASE 6530			AW 6537			EM 6070			FTM 6027		
PREDICTORS	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N
AFQT (Percentile Score)	61.86	16.02	86	64.10	15.53	29	68.65	12.54	43	62.95	15.37	354	72.22	14.67	77
ASVAB COMPOSITE (Navy Standard Score)	227.27	16.70	86	166.80	11.78	30	115.40	8.20	42	161.71	18.52	337	236.38	10.74	72
FACT (%)	0.00	0.00	N/A	0.00	0.00	N/A	2.43	0.00	47	2.27	0.00	362	18.75	0.00	77
CATEGORY (%)	3.84	0.00	90	0.00	0.00	N/A	14.63	0.00	47	4.54	0.00	362	29.16	0.00	77
PROCEDURE (%)	59.61	0.00	90	92.85	0.00	36	14.63	0.00	47	20.45	0.00	362	18.75	0.00	77
RULE (%)	3.84	0.00	90	2.38	0.00	36	24.39	0.00	47	13.63	0.00	362	4.16	0.00	77
PRINCIPLE (%)	32.69	0.00	90	4.76	0.00	36	43.90	0.00	47	59.09	0.00	362	29.16	0.00	77
CRITERIA															
END-OF-COURSE GRADE (% CORRECT)	82.61	5.80	90	83.25	6.28	36	82.17	5.31	46	79.36	5.35	306	77.69	4.80	66
OVERALL TRAINING APPRAISAL SYSTEM (TAS) RATING (5pt Scale)	2.86	0.40	54	2.86	0.68	28	2.80	0.49	36	2.81	0.54	262	2.73	0.64	34
FACT TAS RATING (5pt Scale)	N/A	N/A	N/A	N/A	N/A	N/A	2.94	0.67	36	2.70	0.84	172	2.95	0.59	34
CATEGORY TAS RATING (5pt Scale)	2.74	0.77	53	N/A	N/A	N/A	2.77	0.46	35	2.93	0.61	251	2.83	0.56	27
PROCEDURE TAS RATING (5pt Scale)	2.92	0.39	54	2.88	0.68	28	3.02	0.60	36	2.92	0.61	262	2.73	0.73	34
RULE TAS RATING (5pt Scale)	2.63	0.82	52	2.70	0.88	22	2.62	0.64	36	2.75	0.63	261	2.67	0.73	33
PRINCIPLE TAS RATING (5pt Scale)	2.83	0.47	54	2.76	1.05	25	2.80	0.58	36	2.79	0.58	261	2.54	0.87	26
TIME-TO-COMPLETE THE COURSE (HRS)	446.67	14.99	90	368.00	0.00	36	404.67	30.00	46	259.46	43.45	349	428.03	50.53	66
COST TO PRODUCE ONE GRADUATE($)	4378.00	0.00	90	3646.88	0.00	36	7019.60	0.00	47	2958.57	0.00	362	4196.78	0.00	77

TABLE 6. DESCRIPTIVE STATISTICS OF PREDICTOR AND CRITERION VARIABLES FOR THE CONVENTIONAL "A" SCHOOLS INCLUDED IN THE STUDY (continued)

	GROUP-PACED COURSES											
	GMM 6115			RM-SEA 6380			RM-SHORE 6381			SH 6477		
PREDICTORS	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N
AFQT (Percentile Score)	66.87	13.83	47	55.73	12.60	495	57.60	10.56	397	53.04	10.00	176
ASVAB COMPOSITE (Navy Standard Score)	226.21	13.98	47	105.74	7.96	487	106.45	6.85	388	103.22	8.67	176
FACT (%)	1.85	0.00	47	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
CATEGORY (%)	18.51	0.00	47	20.00	0.00	496	12.50	0.00	400	3.84	0.00	177
PROCEDURE (%)	53.70	0.00	47	80.00	0.00	496	87.50	0.00	400	46.15	0.00	177
RULE (%)	11.11	0.00	47	0.00	0.00	N/A	0.00	0.00	N/A	42.30	0.00	177
PRINCIPLE (%)	14.81	0.00	47	0.00	0.00	N/A	0.00	0.00	N/A	7.69	0.00	177
CRITERIA												
END-OF-COURSE GRADE (% CORRECT)	76.88	4.93	47	N/A	N/A	N/A	N/A	N/A	N/A	89.36	4.40	177
OVERALL TRAINING APPRAISAL SYSTEM (TAS) RATING (5pt Scale)	2.85	0.58	13	2.45	0.68	363	2.62	0.69	309	3.18	0.65	130
FACT TAS RATING (5pt Scale)	2.00	1.10	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CATEGORY TAS RATING (5pt Scale)	2.84	0.73	12	2.54	0.40	354	2.27	0.99	75	3.29	0.84	103
PROCEDURE TAS RATING (5pt Scale)	2.84	0.64	13	2.39	0.60	349	2.63	0.69	309	3.21	0.67	130
RULE TAS RATING (5pt Scale)	3.11	0.63	12	N/A	N/A	N/A	N/A	N/A	N/A	3.17	0.72	130
PRINCIPLE TAS RATING (5pt Scale)	2.77	0.66	11	N/A	N/A	N/A	N/A	N/A	N/A	3.01	0.85	76
TIME-TO-COMPLETE THE COURSE (HRS)	330.80	5.14	47	112.00	0.00	496	72.00	0.00	400	240.00	0.00	177
COST TO PRODUCE ONE GRADUATE($)	4228.68	0.00	47	1419.30	0.00	496	595.68	0.00	400	2129.76	0.00	177

TABLE 7. DESCRIPTIVE STATISTICS OF PREDICTOR AND CRITERION VARIABLES FOR THE BASIC COURSES INCLUDED IN THE STUDY

	COMPUTER-MANAGED INSTRUCTION								
	RM-B 6144			PE-B(EN) 6261			PE-B(MM) 6262		
PREDICTORS	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N
AFQT (Percentile Score)		N/A			N/A			N/A	
ASVAB COMPOSITE (Navy Standard Score)		N/A			N/A			N/A	
FACT (%)	27.27	0.00	894	0.00	0.00	N/A	0.00	0.00	N/A
CATEGORY (%)	18.18	0.00	894	0.00	0.00	N/A	0.00	0.00	N/A
PROCEDURE (%)	54.54	0.00	894	0.00	0.00	N/A	65.21	0.00	552
RULE (%)	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
PRINCIPLE (%)	0.00	0.00	N/A	0.00	0.00	N/A	34.78	0.00	552
CRITERIA									
END-OF-COURSE GRADE (% CORRECT)	N/A	N/A	N/A	N/A	N/A	N/A	91.81	4.51	460
OVERALL TRAINING APPRAISAL SYSTEM (TAS) RATING (5pt Scale)	2.58	0.54	697	N/A	N/A	N/A	2.86	0.61	251
FACT TAS RATING (5pt Scale)	2.53	0.62	683	N/A	N/A	N/A	N/A	N/A	N/A
CATEGORY TAS RATING (5pt Scale)	2.78	0.69	651	N/A	N/A	N/A	N/A	N/A	N/A
PROCEDURE TAS RATING (5pt Scale)	2.55	0.62	684	N/A	N/A	N/A	2.80	0.64	251
RULE TAS RATING (5pt Scale)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PRINCIPLE TAS RATING (5pt Scale)	N/A	N/A	N/A	N/A	N/A	N/A	2.97	0.61	248
TIME-TO-COMPLETE THE COURSE (HRS)	244.31	85.42	885	104.86	30.62	351	92.93	27.72	548
COST TO PRODUCE ONE GRADUATE($)	2838.00	0.00	894	1509.30	0.00	359	1149.40	0.00	552

NOTE: NA = Not applicable; data previously presented in tables 5 and 6.

TABLE 8. SCHOOL INFORMATION: SELF-PACED COURSES (AK, DK, TD, YN)

Information Items	SCHOOL and CDP/CIN*			
	Aviation Storekeeper (AK) "A" School 6522/C-551-2010	Disbursing Clerk (DK) "A" School 6061/A-542-011	Aviation Technician Training Deviceman (TD) "A" School 6521/C-191-2010	Yeoman (YN) "A" School 6057/A-510-0012
Purpose of the Course	Basic administrative and materiel control procedures and operations in squadrons and maintenance departments	Information and procedures to manage/compute pay and allowances and travel entitlements	Basic administration, maintenance and operation of flight simulators, training aids, test equipment, electrical and electromechanical device systems	Apprentice level knowledge of administrative skills and preparation of correspondence
Average Course Length[1] (Contact Hours)	35 days (227.5 hrs)	50 days (350 hrs)	27 days (216 hrs)	35 days (241 hrs)
Organization of Training Content	16 modules composed of topics of varying length; fixed sequence	12 units composed of lesson topics of varied length, in fixed sequence	8 modules composed of lesson topics of varying length; fixed sequence	4 modules consisting of varying number of lesson topics (totaling 43 lesson topics). Modules are presented in a fixed sequence.
Breakdown of Instruction	75% SP for info/theory 25% lab/hands-on	50% SP info/theory 50% lab/hands-on	35% SP for info/theory 65% lab/hands-on (also IMI[2])	17% SP 83% lab for preparation of correspondence typing
Media	Audiovisual (A/V material)	Office machines	A/V material	A/V materials, typing
Performance	Pass each module Hand in homework if fall behind in course. Pass lab exercises	Pass each lesson topic Pass lab exercises	Pass each module	Pass each module
Types of Tests	Multiple-choice, Lab/hands-on	Multiple-choice, Lab practical	Multiple-choice, Lab/hands-on	Lab/hands-on performance tests
Computation of Final Course Grade	SAT/UNSAT. Achieve 100% on module tests in three attempts. Time to complete	Weighted average of unit tests	SAT/UNSAT - must reach 100% criterion (time to complete)	Pass/fail each module

[1] Based on SMEs estimate; refers to actual technical training time only.

[2] IMI refers to instructor managed instruction.

*CDP: Course Data Processing number.
CIN: Course Identification number.

TABLE 8. SCHOOL INFORMATION: SELF-PACED COURSES (AK, DK, TD, YN) (continued)

Information Items	SCHOOL and CDP/CIN			
	Aviation Storekeeper (AK) "A" School 6522/C-551-2010	Disbursing Clerk (DK) "A" School 6061/A-542-011	Aviation Technician Training Deviceman (TD) "A" School 6521/C-191-2010	Yeoman (YN) "A" School 6057/A-510-0012
Class Standing	None. Honor graduate acknowledgment if finish in 20 days	Final course grade. Honor graduate if grade higher than 90%	None	None
Prerequisite Schools	None	None	BE/E AVA-1 (Aviation Fundamentals)	None
Accession Patterns	Recruit Training Command (RTC) Fleet returnees Reservists "JOBS" program personnel	RTC Fleet	RTC AVA, fleet returnees	RTC; few fleet returnees
Billet Assignments After Course Completion	Fleet/Shore	Fleet/Shore	Fleet/Shore	Fleet
Interval Between:				
a. Arrival and starting the course	Same day	Same day	Same day	Same day
b. Graduation and departure to duty station	14 days leave	3 days (then 14 days leave)	Same day	Varies
Remediation Procedures	Retake only questions missed on test to achieve 100%. If fall behind, hand in homework	Redo lesson topics previously failed--amount of work determined by the instructors	Retake questions failed initially	Given special lessons if fail lesson after three attempts. Given two attempts to pass module test if failed first time
Setback Procedures	None formally. ARB counsels student	None formally	None. ARB counsels students	ARB determines if trainee is to setback, especially if trainee fails lesson after three attempts or module tests after two attempts

TABLE 8. SCHOOL INFORMATION: SELF-PACED COURSES (AK, DK, TD, YN) (continued)

	SCHOOL and CDP/CIN			
Information Items	Aviation Storekeeper (AK) "A" School 6522/C-551-2010	Disbursing Clerk (DK) "A" School 6061/A-542-011	Aviation Technician Training Deviceman (TD) "A" School 6521/C-191-2010	Yeoman (YN) "A" School 6057/A-510-0012
SME Comments				
Effectiveness of current method of instruction in achieving the purpose of the course	. No. Unable to keep up with paper changes . Required to change curriculum every quarter; difficult to update . New terminology difficult to teach trainees . Difficult to teach hands-on with SP--changes bring changes to procedures all the time . Writing styles differ among authors with changes. There is alot of rewriting of the procedures by instructors . Lag time (to institute change in the course) too great . Too many changes for SP--can't train to job entry level--train to 3rd class level instead	Yes	. No. SP doesn't train students well in substantive areas like electronics. Curriculum is too easy. Main tests are taken from progress tests in book. Complaint centers on poor materials and testing methods. CISOs are writing materials and tests . Some students "race" the computer which defeats purpose of SP	. No. Too much variation in manuals. One cannot have SP instruction and get standard performance. Manuals are open to interpretation. Instructor becomes a "grading" machine. Students are missing OJT and instructor experiences due to civilian contract teaching
Opinion re overall effectiveness of SP versus GP	. Favor GP. GP would cut turn-around to print course changes. Could have GP at beginning and SP at end of course . 14.6 grade reading level of pubs. Possible mismatch with reading level of trainees . Possibly not retaining information-informal comprehensive exam results indicate 90% first-time failure rate . SP more instructor/curriculum intensive than GP	. Favor GP over SP but staff has not been under GP mode . GP may be better for "lower level" trainees lacking reading skills, etc. . SP better for management and scheduling and flexibility--more throughput of students	Same as above	Favor GP over SP. SP instruction (relies mainly on) examples specific to the school

TABLE 9. SCHOOL INFORMATION: SELF-PACED COURSES (IM, MM1200 PSI, MM600 PSI, PN)

	SCHOOL and CDP/CIN			
Information Items	Instrumentman (IM) "A" School 6046/A-670-0010	Machinist's Mate (MM) 1200 psi "A" School 6492/A-651-0053	Machinist's Mate (MM) 600 psi "A" School 6493/A-651-0082	Personnelman (PN) "A" School 6057/A-500-0014
Purpose of the Course	Basic procedures to repair, calibrate, and perform casualty analysis on precision, mechanical measuring instruments	Basic understanding of operational and preventive maintenance procedures of conventional (non-nuclear) 1200 psi turbines	Present nuclear power school students with basic understanding of 600 psi turbines and evaporators	Basic clerical duties, typing skills, and preparation of Naval correspondence and use of manuals
Average Course Length[1]	100 days (750 hrs)	34 days (248.2 hrs)	10 days (73 hrs)	36 days (217 hrs)
Organization of Training Content	15 modules with varying number of lessons within each module. Fixed sequence	16 modules with varying number of lessons within each module. Watch station indoctrination presented after last module. Fixed sequence	16 modules with varying number of lessons within each module. Watch station indoctrination presented after last module. Fixed sequence	60 lessons organized into 4 major phases. Fixed sequence. Lesson length varies
Breakdown of Instruction	50% SP for info/theory. 50% lab/hands-on practice	70% SP for info/theory 18% lab/hands-on practice 12% classroom seminar for discussion	70% SP for info/theory 30% lab/hands-on practice	SP (no breakdown given in percentages) lab/hands-on
Media	Written material	Steam propulsion plant	Steam propulsion plant	Written material
Performance Measures	Pass each lesson. Hand in homework if fall behind. Pass lab exercises. Pass written test for knowledge	Pass each module. Pass lab in watch-standing	Pass each module. Pass lab exercise on evaporators. Sometimes have to pass each lesson within a module	Pass each lesson. Pass lab/exercise
Types of Tests	Multiple-choice and lab/hands-on. Homework assignments on case-by-case basis	Multiple-choice and fill in the blanks. Watch-standing graded on SAT/UNSAT basis	Multiple-choice and hands-on test on evaporators	Multiple-choice lab/hands-on

[1] Based on SMEs' estimates; refers to actual training time only.

TABLE 9. SCHOOL INFORMATION: SELF-PACED COURSES (IM, MM1200 PSI, MM600 PSI, PN) (continued)

Information Items	SCHOOL and CDP/CIN			
	Instrumentman (IM) "A" School 6046/A-670-0010	Machinist's Mate (MM) 1200 psi "A" School 6492/A-651-0053	Machinist's Mate (MM) 600 psi "A" School 6493/A-651-0082	Personnelman (PN) "A" School 6057/A-500-0014
Computation of Final Course Grade	Comprehensive final. If fail, then compute average from prior module test results	Comprehensive final requiring 80.57% and above to pass. Comprehensive orals given in seminars	Comprehensive final requiring 91.26% to pass	Time to completion
Class Standing	Not computed	Honor graduates require greater than 95.37% and complete course in 25 days	Honor graduates require greater than 97.32% and complete course in 6 days	None used
Prerequisite Schools	None	PE BASICS	PE BASICS	None
Accession Patterns	RTC	RTC	RTC	RTC
Billet Assignments After Course Completion	Fleet	Fleet	Nuclear Power School in Orlando	Fleet
Interval Between:				
a. Arrival and starting the course	Same day	2 days	Same day	1 day
b. Graduation and departure to duty station	About 3 weeks; includes about 15 days leave	15 days leave	15 days leave	3 days
Remediation Procedures	Repeat lessons within module with aid from instructor/course officer/or ARB[2]	Instructor counsels trainees every 5 days for personal problems. Typically, there is "oral" remediation without documentation	Same as MM 1200	Goes to classroom to study the failed test--retake test under supervision of learning center instructor. Trainee counseled if falls behind by 5 lessons
Setback Procedures	Repeat module. ARB attempts to find cause of trainee's poor performance	ARB reviews academic and motivation problems to determine setbacks. Trainee set back for not passing seminars	None formally. Nuclear Power Advisor decides whether student should be dropped or waivered	ARB questions trainee on subject matter if trainee fails the retake test. Decision is then made to setback, etc.

[2] Academic Review Board.

TABLE 9. SCHOOL INFORMATION: SELF-PACED COURSES (IM, MM1200 PSI, MM600 PSI, PN) (continued)

Information Items	SCHOOL and CDP/CIN			
	Instrumentman (IM) "A" School 6046/A-670-0010	Machinist's Mate (MM) 1200 psi "A" School 6492/A-651-0053	Machinist's Mate (MM) 600 psi "A" School 6493/A-651-0082	Personnelman (PN) "A" School 6057/A-500-0014
SME Comments				
Effectiveness of current method of instruction in achieving the purpose of the course	. Yes, but lockstep (GP) more effective with a dynamic instructor . SP would replace a low/mediocre instructor	. Yes, with exception of time required in 1200 (hot) plant[3] . (trainee) should be doing more (activities) within the 6 days of watch . the hot plant is used for many activities (PEO,[4] etc.) but trainee not allowed to put "hands-on" even though plant was built to train 1200 psi trainees . SP is adequate with (GP) seminar as a check point	. No, no comprehension (by students) in course . Probably not much retention . Original purpose was to present terminology and functions, and "weed-out" inadequate Nuclear Power School selectees. (However, the students are) actually not weeded out properly because only approximately .5% weeded out, and approximately 70% dropout later in Nuclear Power School	. Yes, SP best for job entry level . Would lose more under GP instruction of job entry level skills
Opinion of overall effectiveness of SP versus GP	See above	. SP emphasizes quantity over quality . SP adequate with a seminar . Not much self-satisfaction of instructors in SP	. Suggest sending only honor grads to Nuclear Power School and give them the MM600 course there in Orlando	Favor SP

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[3] Parentheses "( )" added to complete the flow of the comments.

[4] Prospective Engineering Officer.

TABLE 10. SCHOOL INFORMATION: CMI COURSES (EN, AD, RM BASICS, PE BASICS)

Information Items	SCHOOL and CDP/CIN			
	Engineman (EN) "A" School 6482/A-652-0010	Aviation Machinist's Mate (AD) "A" School 6501/C-601-2010	Radioman (RM) Basics "A" School 6144/A-202-0014	Propulsion Engineering (PE) Basics 6261 (EN)/6262 (MM1200 & MM600)/ A-651-0010
Purpose of Course	Basic operation and maintenance of diesel engines. Perform as Engineman Messenger of the Watch (EMOW) and Engineman Petty Officer of the Watch (EPOW) for diesel propulsion plant	Basic understanding of operations and principles of aircraft propulsion, hydroelectric, and rotary wing dynamics, systems replacement, and maintenance	Security procedures for messages, code signs, use of manuals, and preparation of message formats on teletype	Familiarize BTs, MMs, and ENs with hand tools and basic principles of engineering system components in shipboard propulsion plants
Average Course Length[1] (Content Hours)	17 days (85 hrs)	27.5 days (216 hrs)	33.5 days (258 hrs)	17.5 days (129 hrs)
Organization of Training Content	15 modules. Each module has a topic in 3 levels: programmed instruction, narrative, and summary. Length of modules varies with topic. Modules presented in fixed sequence	11 modules composed of lesson topics, fixed sequence	Modules with varying lengths. Each module covers a major topic; fixed sequence	13 modules. Each module has a topic composed of varying number of lessons. Modules presented in fixed sequence
Breakdown of Instruction	50% CMI info/theory 50% laboratory for hands-on practice	40% CMI info/theory 30% GP - discussion 30% lab/hands-on	40% CMI for info/theory 60% lab/hands-on in TTY drills	60% CMI info/theory 20% lab for hands-on
Media	Manuals and movies	A/V material	Written material; TTY equipment	Slide/sound projections; operational equipment
Performance Measures	Pass each module. Hand in homework if fall behind. Uses work booklet; read micrometers in lab. Stand EMOW and EPOW successfully. Final comprehensive exam	Pass module tests	Pass each module Pass lab practical	Pass each module, pass lab exercises. Some modules have more than one test. Sometimes tests are grouped over series of lessons across modules
Types of Tests	Multiple-choice and lab/hands-on. In multiple choice, write answer in test booklet and then convert to multiple-choice alternative	Multiple-choice, lab/hands-on	Multiple-choice, lab/hands-on	Multiple-choice and lab/hands-on. Paper-pencil tests may also consist of just choosing answer from a group of answers, not necessarily in a multiple-choice format

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[1] Based on SMEs' estimates; refers to actual training time only.

TABLE 10. SCHOOL INFORMATION: CMI COURSES (EN, AD, RM BASICS, PE BASICS) (continued)

Information Items	SCHOOL and CDP/CIN			
	Engineman (EN) "A" School 6482/A-652-0010	Aviation Machinist's Mate (AD) "A" School 6501/C-601-2010	Radioman (RM) Basics "A" School 6144/A-202-0014	Propulsion Engineering (PE) Basics 6261 (EN)/6262 (MM1200 & MM600)/ A-651-0010
Computation of Final Course Grade	One final exam with 150 questions worth two-thirds of a point each. 80.57% is minimum passing grade. Also, must pass at least 80% of modules	Weighted sum of CMI, Shop, and GP performance tests 63% to pass	Time to completion	One final exam with 150 questions. Honor graduate must have at least 95% on final exam and complete course in 7½ days
Class Standing	Based on final exam, three groups are ranked: 80.57 - 87, 88 - 94, 95 - 100	Final course grade	None. Accelerated advancement if complete the course within 20% of projected time, and then can make E-3 without advancement test	None - use above criteria for honor graduate
Prerequisite	PE BASICS	AFUN-P (Aviation Fundamentals)	None formally. If time permits, 4-5 days pretyping training is given	None
Accession Patterns	RTC and 5% from fleet	RTC	RTC	RTC
Billet Assignments After Course	Fleet, 5-10%; "C" School for rest	NAMTRA (Advanced Aviation Machinist training)	RM "A" School (Sea or Shore)	BT, EN, or MM "A" School
Interval Between:				
a. Arrival and starting the course	1 day. Start "A" School when begin PE BASICS	Same day	25 days (attending basic military instruction)	5 days - includes 3 days of indoctrination
b. Graduation and departure to duty station	1 week; longer for overseas assignments	3 days	1 day	less than 2 days
Remediation Procedures	Upon failing a module, trainee reviews items missed with the instructor; oral remediation with instructor; or repeats workbook	In the CMI portion of the course, student reviews failed lesson and then is verbally questioned by instructor. In GP and lab, only verbal questioning by instructor	Retakes failed module until achieves 100% correct	Learning Center Supervisor determines whether student needs tutoring or night study (2 hrs/night)
Setback Procedures	If student fails modules after four attempts, ARB makes decision about set back	None, ARB counsels	None	ARB decides whether to set back student. Few setbacks, 10-15/yr. When set back, student starts with module which resulted in original failure

TABLE 10. SCHOOL INFORMATION: CMI COURSES (EN, AD, RM BASICS, PE BASICS) (continued)

	SCHOOL and CDP/CIN			
Information Items	Engineman (EN) "A" School 6482/A-652-0010	Aviation Machinist's Mate (AD) "A" School 6501/C-601-2010	Radioman (RM) Basics "A" School 6144/A-202-0014	Propulsion Engineering (PE) Basics 6261 (EN)/6262 (MM1200 & MM600)/ A-651-0010
SME Comments				
Effectiveness of current method of instruction in achieving the purpose of the course	Yes - adequate but scope should be widened to cover A Division and auxiliary topics	No - course does not produce apprentice mechanics. Instructor apathy present and students are not treated with concern	No response reported	. Yes - about 85-95% effective if used properly . Up to instructors to pick out academic problems and correct them, but some instructors can't handle academic problems and depend too much on computers to manage course fully . A big problem is that 30-40% students have difficulty in reading/ comprehension
Opinion re effectiveness of SP versus GP	GP would be better than SP in increasing scope of content to better reflect true fleet conditions	. GP would be better than SP . Instructors feel that they are clerks . Theoretically, student can go through course and never ask a question . A lot of instructor apathy	No response reported	SP worse than GP, but perhaps this opinion due more to ignorance of capabilities of computer and training of instructors (than to SP, per se)

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TABLE 11. SCHOOL INFORMATION: CONVENTIONAL COURSES (AE, ASE, AW)

	SCHOOL and CDP/CIN		
Information Items	Aviation Electrician's Mate (AE) "A" School 6515/C-602-2012	Aviation Support Equipment Technician Electrical (ASE) "A1" School 6530/C-602-2019	Aviation Anti-Submarine Warfare Operator (AW) "A" School 6537/C-210-2010
Purpose of the Course	Basic maintenance procedure on aircraft electrical, electronic, and instrument systems	Basic electrical skills	Analysis of sensory data to detect submarines via understanding of basic magnetic theory, radar and ESM (electronic sensor machines) systems, sonar systems, and power plants
Average Course Length[1] (Contact Hours)	55 days (363 hrs)	47 days (368 hrs)	58 days (383 hrs)
Organization of Training Content	9 major units composed of varying numbers of lesson topics; fixed sequence	3 major phases with 1-5 units per phase; fixed sequence	11 units composed of lesson topics of varying length; fixed sequence
Breakdown of Instruction	70% GP info/theory 30% lab/hands-on	50% GP for info/theory 50% lab/hands-on	50% GP info/theory 50% lab/hands-on
Media	Mock-ups, training devices, actual aircraft	A/V materials; operational equipment	A/V material
Performance Measures	Pass unit tests, pass lab practicals	For each unit, pass written exam, practical exercise, and lab performance	Pass each lesson, hand in homework
Types of Tests	Multiple-choice, lab/hands-on	Multiple-choice, lab/hands-on exercises, some homework	Multiple-choice, lab/hands-on, homework
Computation of Final Course Grade	Average of 11 unit tests. Each unit test grade is to include written, practical, and performance results	Average of unit exams, lab grade, performance grade, and final comprehensive exam	Weighted average of three-phase exams (90%) and final comprehensive exam (10%)
Class Standings	Final course grade	Final grade	Final course grade

[1] Based on SMEs' estimates; refers to actual technical training time only.

TABLE 11. SCHOOL INFORMATION: CONVENTIONAL COURSES (AE, ASE, AW) (continued)

Information Items	SCHOOL and CDP/CIN		
	Aviation Electrician's Mate (AE) "A" School 6515/C-602-2012	Aviation Support Equipment Technician Electrical (ASE) "A1" School 6530/C-602-2019	Aviation Anti-Submarine Warfare Operator (AW) "A" School 6537/C-210-2010
Prerequisite Schools	BE/E AFUN-A	BE/E Aviation Fundamentals	AFUN - P (GP course, 8 days)
Accession Patterns	RTC	RTC	RTC
Billet Assignments After Course Completion	Fleet NAMTRA units FRAMP (Fleet Replacement)	Fleet Shore NAMTRADET	Naval Aircrew Candidate course for 6 weeks; then to a Replacement Air Group (RAG); and then to the Fleet
Interval Between:			
a. Arrival and starting the course	3 days	14 days	7 days
b. Graduation and departure to duty station	Same day	Same day	2 days
Remediation Procedures	Night study for 3 days to retake failed test	Retakes failed unit exam next day after night study - can request a remediation instructor for that night	None
Setback Procedures	ARB makes decision after second failure of test	Infrequent - most setbacks are medical	If failed tests, ARB makes decision

TABLE 11. SCHOOL INFORMATION: CONVENTIONAL COURSES (AE, ASE, AW) (continued)

Information Items	SCHOOL and CDP/CIN		
	Aviation Electrician's Mate (AE) "A" School 6515/C-602-2012	Aviation Support Equipment Technician Electrical (ASE) "A1" School 6530/C-602-2019	Aviation Anti-Submarine Warfare Operator (AW) "A" School 6537/C-210-2010
SME Comments			
Effectiveness of current method of instruction in achieving the purpose of the course	Yes	Yes - instructor/student relationship very important in achieving the goals of the course. Instructor/student ratio is 1:11 in class and 1:3 in shop	Yes
Opinion re effectiveness of SP versus GP	. Favor GP over SP based on experience with having to reteach BE/E (to AE trainees) . Student comments favor GP	. Favor GP over SP . Many negative comments about BE/E - seem to be problems associated with retention of material learned in BE/E	Favor GP over SP

TABLE 12. SCHOOL INFORMATION: CONVENTIONAL COURSES (EM, FTM, GMM)

Information Items	SCHOOL and CDP/CIN		
	Electrician's Mate (EM) "A" School 6070/A-662-0016	Fire Control Technician Missile (FTM) "A" School, Phase I 6027/A-113-0010	Gunner's Mate, Missile (GMM) "A" School 6115/A-041-0010
Purpose of the Course	Basic electronic and mechanical principles, theory, procedures, and troubleshooting skills	Basic operations of electronic and electromechanical test equipment, circuits. Casualty analysis and corrective and preventive maintenance	Basic skills in electricity and hydraulics; PMS (Preventive Maintenance System) in weapon systems; prepare for "C" School
Average Course Length[1] (Contact Hours)	43 days (217.5 hrs)	55 days (401.5 hrs)	60 days (327.5 hrs) (Graduation date fixed regardless of interruptions)
Organization of Training Content	Lessons with varying lengths. Units are weekly segments and a lesson topic is a variable portion of the unit week. Fixed sequence	12 major topics of varying lengths. Fixed sequence	Twelve 1-week units; varying number of lessons within each unit. Units presented in fixed sequence
Breakdown of Instruction	75% GP for info/theory 25% lab/hands-on	80% GP for info/theory 20% lab/hands-on	85% GP 15% lab practice of small arms weapons only
Media	A/V materials; mock-ups	A/V material, training devices	Overhead projections
Performance Measures	Pass each unit; pass lab/hands-on. Hand in homework	Pass each lesson, hand in homework. Pass lab exercises	Pass exam at end of each unit each week
Types of Tests	Multiple-choice, lab/hands-on exercise	Multiple-choice, lab/hands-on	Multiple-choice and lab/hands-on. Quizzes also administered at instructor discretion
Computation of Final Course Grade	Weighted average of seven unit tests, final comprehensive exam and practical exam	Average of 11 weekly tests and 2 comprehensive exams (electronic and electromechanical blocks)	Sum all weekly exams and divide by number of weeks. This value is weighted 80% and quiz averages weighted 20%. Final weighted average to pass must be at least 63%

[1] Based on SMEs' estimates; refers to actual training time only.

TABLE 12. SCHOOL INFORMATION: CONVENTIONAL COURSES (EM, FTM, GMM) (continued)

Information Items	SCHOOL and CDP/CIN		
	Electrician's Mate (EM) "A" School 6070/A-662-0016	Fire Control Technician Missile (FTM) "A" School, Phase I 6027/A-113-0010	Gunner's Mate, Missile (GMM) "A" School 6115/A-041-0010
Class Standings	Final grade	Final course grade	Based on final weighted score--high scores result in accelerated advancement
Prerequisite Schools	BE/E	BE/E	BE/E
Accession Patterns	RTC Fleet returnees	RTC	RTC; only two fleet returnees at any given time
Billet Assignments After Course Completion	Males: Fleet (non-nuclear trainees); Orlando Nuclear Power School (nuclear power trainees). Females: shore duty	Fleet, if 4 year obligor FT Phase 2 School, if 6 year obligor	Fleet
Interval Between:			
a. Arrival and Starting the Course	30 days (seasonally, varies)	7 days	30 days
b. Graduation and Departure to Duty Station	Same day	2 days	Same day
Remediation Procedures	Retakes the lesson failed, if failed test by two questions. Handled by phase supervisor.	Given study package after failing test, then retakes test	If student fails unit test on Friday, review material that evening and take retest on Saturday morning
Setback Procedures	Repeats the weekly unit (all retaken tests given grade of 63%) and attend night study. Handled by ARB	If fail retake, ARB determines outcome	If student fails any two tests, setback 1 week. ARB will also decide to setback student if low motivation or adaptability issues are present

TABLE 12. SCHOOL INFORMATION: CONVENTIONAL COURSES (FM, FTM, GMM) (continued)

	SCHOOL and CDP/CIN		
Information Items	Electrician's Mate (EM) "A" School 6070/A-662-0016	Fire Control Technician Missile (FTM) "A" School, Phase I 6027/A-113-0010	Gunner's Mate, Missile (GMM) "A" School 6115/A-041-0010
SME Comments			
Effectiveness of current method of instruction in achieving the purpose	. Yes . Labs need improvement (time is too short presently)	Yes	. Could be more effective with more time . Old two-phase course was more effective . BE/E instructors are not motivated as well as the students . Rapport is important aspect of platform instruction
Opinion re effectiveness of SP versus GP	. Favor GP over SP . Retrack BE/E to EM trainee	. Favor GP over SP because BE/E grads don't seem to retain information taught in BE/E . GP instructor is needed to teach "fine point" differences in rates	. Favor GP over SP . SP may be good in adjunct-remediation

68

67

TABLE 13. SCHOOL INFORMATION: CONVENTIONAL COURSES (RM-SEA, RM-SH, SH)

Information Items	SCHOOL and CDP/CIN		
	Radioman (RM) "A" Sea School 6380/A-202-0026	Radioman (RM) "A" Shore School 6381/A-202-0027	Ship's Serviceman (SH) "A" School 6477/A-823-0012
Purpose of the Course	Basic operations in a radio shack aboard ship; operating certain systems and working with actual equipment	Basic operations in a shore communications systems (not trained in setting up equipment)	Operation of ship shores, bulk store, vending machine maintenance, and laundry operations
Average Course Length[1] (Contact Hours)	20 days (112 hrs)	8 days (72 hrs)	30 days (240 hrs)
Organization of Training Content	Evening and day watches and basic systems shipboard laboratory. Fixed sequence and length	Watches of fixed sequence and length	Lesson topics in fixed sequence of instruction
Breakdown of Instruction	30% GP for info/theory 70% lab/hands-on	30% GP for info/theory 70% lab/hands-on	83% GP for info/theory 17% lab/hands-on
Media	Actual operational equipment; written material; simulated message traffic	Simulators and samples of messages	A/V material
Performance Measures	Pass lab exercises/tests	Pass lab exercises	Hand in homework, pass lab exercise, pass unit tests
Types of Tests	Multiple-choice, lab/hands-on tests	Lab/hands-on	Multiple-choice, lab exercises
Computation of Final Course Grade	SAT/UNSAT determined by instructor observation	SAT/UNSAT determined by instructor observation	Average of four unit tests
Class Standings	None	None	Final course grade
Prerequisite Schools	RM BASICS	RM BASICS	None

[1] Based on SMEs' estimates; refers to actual training time only.

TABLE 13. SCHOOL INFORMATION: CONVENTIONAL COURSES (RM-SEA, RM-SH, SH) (continued)

	SCHOOL and CDP/CIN		
Information Items	Radioman (RM) "A" Sea School 6380/A-202-0026	Radioman (RM) "A" Shore School 6381/A-202-0027	Ship's Serviceman (SH) "A" School 6477/A-823-0012
Accession Patterns	RTC Fleet Reservists	RTC Fleet Reservists	RTC
Billet Assignments After Course Completion	Fleet Advanced schools	Fleet Assist recruiters for short time	Fleet Advanced schools
Interval Between:			
a. Arrival and starting the course	2 days	2 days	5 days (typing lab)
b. Graduation and departure to duty station	3 days	3 days	Same day
Remediation Procedures	None formally; instructor present during watches/lab to aid trainee	None formally; instructor present during watches/lab to aid trainee	If less than 80% on unit test, top scoring students brief low scoring students
Setback Procedures	Return to next convening class	Return to next convening class	None. Staff spends a lot of time with students. ARB provides corrective counseling

TABLE 13. SCHOOL INFORMATION: CONVENTIONAL COURSES (RM-SEA, RM-SH, SH) (continued)

Information Items	SCHOOL and CDP/CIN		
	Radioman (RM) "A" Sea School 6380/A-202-0026	Radioman (RM) "A" Shore School 6381/A-202-0027	Ship's Serviceman (SH) "A" School 6477/A-823-0012
SME Comments			
Effectiveness of current method of instruction in achieving the purpose of the course	No response reported	No response reported	. Yes - high (degree of) enthusiasm . High (degree of) comprehension due to personal contact of instructors with student
Opinion re effectiveness of SP versus GP	No response reported	No response reported	. Favor GP over SP instructor . Contact with student is very important; don't have instructor burnout . Instructor experience (in class) is good for the fleet

REGRESSION ANALYSES

The significant results of the regression analyses are summarized in two complementary tables. For the reader interested in the technical details, a point-by-point delineation of the study findings, along with the supporting statistical evidence, is provided in appendix G. Also, zero-order parametric and nonparametric correlations are presented in appendix H.

The sheer volume of data available for presentation required a synthesis of the overall findings. The essential findings of the study are summarized in both a statistical and narrative form in tables 14 and 15. Table 14 shows the significance (+ or -) or nonsignificance (ns) of statistical relationships between variables examined. For the significant findings, the direction(s) of the relationship(s) is shown. Table 15 presents the same information in a narrative format. Significant results are identified by answering (Yes or No) pertinent questions about each predictor-criterion relationship.

Note that training costs, task-specific fleet supervisor TAS ratings, method of instruction, and percentage of generic tasks taught[4] were not included as predictor or criterion variables in the within-schools analyses. The reason for their exclusion is that these variables are fixed (constant) or derived within each course. Thus, there would be no variance among graduates within a course upon which a regression analysis could be performed. An additional new predictor variable, specific skill level (see page 14), however, was used in the intraschool analyses. This variable was added to determine if specific skill levels predict training effectiveness/efficiency to the same extent as general ability levels.

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[4] These four variables were examined in the interschool analyses reported in TAEG 117.

TABLE 14. STATISTICAL SUMMARY OF REGRESSION ANALYSES

		METHODS OF INSTRUCTION/SCHOOLS																							
		SP								CMI					GP								
CRITERION	PREDICTOR	AK	DK	IM	MM-600	MM-1200	PN	TD	YN	AD	EN	PE-B EN	PE-B MM	RM-B	AE	ASE	AW	EM	FTM	GMM	SEA	SH	SH
TICOM	AFQT	ns	-	ns	-	-	ns	-	ns	-	ns	-	-	-	ns	NA	ns	ns	ns	-	NA	NA	NA
	COMP	ns	-	ns	-	-	ns	ns	ns	-	ns	-	-	-	ns	NA	ns	ns	ns	ns	NA	NA	NA
EOCG	AFQT	NA	+	+	+	+	NA	NA	NA	+	+	NA	+	NA	+	ns	ns	+	ns	+	NA	NA	ns
	COMP	NA	+	+	+	+	NA	NA	NA	+	+	NA	+	NA	+	+	ns	ns	+	ns	NA	NA	ns
	TICOM	NA	-	ns	-	-	NA	NA	NA	-	-	NA	-	NA	-	NA	-	ns	-	-	NA	NA	NA
TAS	AFQT	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	NA	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	COMP	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	NA	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	+
	TICOM	ns	ns	ns	ns	ns	ns	ns	-	ns	-	NA	ns	ns	ns	NA	ns	ns	ns	ns	NA	NA	NA
	EOCG	NA	ns	ns	+	ns	NA	NA	NA	+	+	NA	ns	NA	ns	ns	ns	+	ns	ns	NA	NA	ns
COMP	AFQT	+	+	+	+	+	+	+	+	+	+	NA	NA	NA	+	+	+	+	+	+	+	+	+

NOTES:
1. - = Significant negative relationship (higher scores on predictor variable associated with lower scores on criterion variable).
2. + = Significant positive relationship (higher scores on predictor variable associated with higher scores on criterion variable).
3. ns = Relationship between predictor and criterion variables found to be statistically nonsignificant.
4. NA = Data were not available (nor applicable) on which to perform an analysis.
5. No significant interactions among the predictor variables were found with any school included in the intraschool analyses.
6. Individualized courses are composed of self-paced (SP) and computer-managed instruction (CMI) courses. Conventional courses are group-paced (GP) courses.
7. TICOM = Training Time.
8. EOCG = End-of-Course Grades.
9. TAS = Training Appraisal System (Fleet Supervisor Ratings).
10. COMP = ASVAB selector composite score.
11. AFQT = Armed Forces Qualification Test percentile (general ability level).

TABLE 15. NARRATIVE SUMMARY OF REGRESSION ANALYSES

PREDICTOR VARIABLES	PREDICTOR-CRITERION RELATIONSHIPS	METHOD OF INSTRUCTION/SCHOOLS																					
		SP								CMI					GP								
		AK	DK	IM	MM-600	MM-1200	PN	TD	YN	AD	EN	PE-B EN	PE-B MM	RM-B	AE	ASE	AW	EM	FTM	GMM	RM-SEA	RM-SH	SH
1. AFQT	As compared with those with lower AFQT scores, graduates with higher scores:																						
	a. took less time to complete the course	N	Y	N	Y	Y	N	Y	N	Y	N	Y	Y	Y	N	NA	N	N	N	Y	NA	NA	NA
	b. received higher end-of-course grades	NA	Y	Y	Y	Y	NA	NA	NA	Y	Y	NA	Y	NA	Y	N	N	Y	N	Y	NA	NA	N
	c. received higher supervisor ratings	N	N	N	N	N	N	N	N	N	N	NA	N	N	N	N	N	N	N	N	N	N	N
	d. also had higher ASVAB composite scores	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	NA	NA	Y	Y	Y	Y	Y	Y	Y	Y	Y
2. ASVAB COMPOSITE	As compared with those with lower ASVAB selector composite scores, graduates with higher scores:																						
	a. took less time to complete the course	N	Y	N	Y	Y	N	N	N	Y	N	Y	Y	Y	N	NA	N	N	N	N	NA	NA	NA
	b. received higher end-of-course grades	NA	Y	Y	Y	Y	NA	NA	NA	Y	Y	NA	Y	NA	Y	Y	N	N	Y	N	NA	NA	N
	c. received higher supervisor ratings	N	N	N	N	N	N	N	N	N	N	NA	N	N	N	N	N	N	N	N	N	N	Y
3. TRAINING TIME	As compared with those who took more time to complete the course, graduates with lower training time:																						
	a. received higher end-of-course grades	NA	Y	N	Y	Y	NA	NA	NA	Y	Y	NA	Y	NA	Y	NA	Y	NA	Y	Y	NA	NA	NA
	b. received higher supervisor ratings	N	N	N	N	N	N	N	Y	N	Y	NA	N	N	N	NA	N	N	N	N	NA	NA	NA
4. END-OF-COURSE GRADES	As compared with those with lower end-of-course grades, graduates with higher grades:																						
	. received higher supervisor ratings	NA	N	N	Y	N	NA	NA	NA	Y	Y	NA	N	NA	N	N	N	Y	N	N	NA	NA	N

NOTE: N = No; no significant difference between high and low groups on predictor variables.
Y = Yes; significant difference between high and low groups on predictor variables.
NA = Not applicable; no data available for predictor and/or criterion variables.

SECTION IV

DISCUSSION

The study results are discussed in this section. Relationships among training efficiency and training effectiveness measures and method of instruction, general ability, and specific ability are interpreted. Correlations between AFQT percentile and ASVAB selector composite scores are also discussed.

TRAINING EFFICIENCY

Higher ability was related to shorter training time in individualized courses but not in conventional courses. Thus, the inverse relationship between ability and training time (i.e., the higher the graduate's ability, the shorter his/her training time) observed *across* individualized courses (TAEG 117) holds within the majority of the individualized courses sampled. However, when the data of graduates were previously grouped *across* conventional courses, it was observed that higher ability graduates spent more time in conventional courses than did lower ability graduates. This relationship did not exist *within* the majority of the conventional courses sampled. Higher ability graduates spent about the same amount of time in training as lower ability graduates within the same conventional courses. This finding suggests that, overall, higher ability students were placed in conventional courses with longer course lengths than were lower ability students. However, higher ability students did not take more time to graduate from a specific conventional course than lower ability students in the same course. It is possible that a clearer relationship between ability and training time might have been found within conventional courses if documentation of student setback/remediation hours had been more extensive.

In summary, higher ability graduates were more efficiently trained (i.e., shorter training time) than lower ability graduates under individualized instruction. However, training efficiency was the same for higher and lower ability graduates under conventional instruction.

Higher ability was related to shorter training time for graduates of the PE-Basics (EN), PE-Basics (MM), and RM-Basics schools. For graduates of the PE-Basics (MM) course (CMI course), this relationship was also observed in their respective MM-600 and MM-1200 "A" schools (both self-paced). The same relationship found for PE-Basics (EN) graduates did not transfer when they attended EN "A" school (both of which are CMI courses). The RM-Basics finding could not be compared to one from the group-paced RM-Sea and RM-Shore schools since training time was fixed (without variance) for both RM "A" schools. Thus, ability-time data could not be significantly correlated for graduates of the RM "A" schools.

TRAINING EFFECTIVENESS

Training effectiveness is discussed at the school level and in the fleet setting.

SCHOOL LEVEL. Higher general ability and specific skill level measures were consistently related to higher end-of-course grades for graduates of individualized courses but were inconsistent predictors for conventional course graduates. These results confirm the overall findings observed across schools that higher ability was associated with higher school grades for graduates of individualized courses but not for graduates of conventional courses.

The failure, in this study, to find consistent relationships between ability levels and grades for conventionally trained graduates is interesting since previous research has documented a positive relationship between these two variables (Cronbach & Snow, 1977). One possible interpretation is that this failure is a function of the kinds of learning or types of generic task training that occur in the different CI schools. However, no evidence was obtained in the present study (or in the previous study, TAEG 117) to suggest that school performance of different ability level graduates was related in any systematic manner to different amounts of generic training tasks taught in the schools sampled.

An alternative interpretation is that the grading system used in CI courses is not sufficiently sensitive to discriminate among students of different abilities. Another is that the CI context contains elements that adversely affect motivation of higher ability students to excel much beyond the minimum school performance criterion. For example, the higher ability CI graduates may have been exposed to a level of training content designed for the majority (i.e., mid to lower ability level) of CI graduates and this material may have posed a limited challenge to the more capable students. Additionally, the higher ability CI graduates' motivation may be affected by their inability to control the amount of time they will spend in the CI course.

Shorter training time was related to higher grades (an inverse relationship) for graduates of individualized and conventional courses. For the individualized graduates, this time-grade relationship may represent a student ability/motivation factor underlying school performance since the individualized student has some control of training time. For conventional course graduates, the variable course lengths of those setback/remediated may have provided sufficient variance to detect a relationship with end-of-course grades. This inverse relationship may have arisen by conventional schools assigning only a minimal passing grade to setback/remediated students upon their successful completion of the course. This practice could have resulted in lower grades being associated with longer training times for these students, and higher grades with shorter training times for those not setback/remediated.

FLEET SETTING. No significant relationships between AFQT and TAS ratings were found for any of the individualized and conventional courses. A significant (positive) relationship was found between ASVAB selector composite scores and TAS ratings for only one (the SH course) out of 21 applicable courses. Only two (YN and EN schools) out of 17 applicable courses showed a significant (negative) relationship between training time and TAS ratings. Significant relationships between end-of-course grades and TAS ratings were found for only four (MM600, AD, EN, and EM schools) out of 14 courses for which data were available. Subsequent analyses of the raw score regression weights of each school that did show a significant relationship between each predictor and TAS ratings revealed that these findings could be attributed to chance.[5] Additional data supporting the regression analysis conclusions are presented in appendix H. Thus, training effectiveness measures from the job setting did not relate to school-level effectiveness/efficiency measures or to ability characteristics of school graduates other than on a chance basis. These intraschool findings support those of the interschool analyses (TAEG 117) which also indicated no significant or relevant relationships between TAS ratings and ability or school-level effectiveness/efficiency measures.

The failure to find significant relationships between TAS supervisor ratings and school measures on the same graduates raises questions concerning the validity of currently available indices of training adequacy. This evidence suggests that two available measures of training adequacy, grades and TAS ratings, do not measure the same thing. Since the present study was not designed to assess the validity of these measures, no definitive statements can be made about the validity of either. However, the data of this study support the existence of some degree of validity of end-of-course grades[6] as measures of training adequacy. End-of-course grades show relationships with general and specific ability measures and with time to complete training (convergent/construct validity) that one would expect from a measure of training adequacy while the TAS ratings do not (see tables 14 and H-1). These findings, coupled with the lack of published evidence establishing the reliability and validity of the TAS ratings, prompt the recommendation that steps be taken to assess the validity of the TAS ratings.

INTERCORRELATION OF AFQT AND ASVAB SELECTOR COMPOSITE SCORES

As indicated in tables 14 and 15 (section III), both the AFQT percentile and ASVAB selector composite scores predicted training effectiveness/efficiency to the same extent for the majority of schools sampled in the present study. (However, there was some inconsistency in predictive relationships for conventional courses with respect to end-of-course grades.)

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[5] The Bonferroni technique (also called the Fisher Technique) for testing the significance of joint estimation was used. This technique essentially adjusts the alpha level (.05) by the number of tests (i.e., the number of schools) conducted for each predictor-criterion relationship (for more details, see Lindman 1974).

[6] While the case can be made that end-of-course grades probably have some degree of validity, it is also probably true that validity can be enhanced by improving testing and grading procedures at Navy schools.

An additional finding of this study was that AFQT scores and ASVAB selector composite scores were highly intercorrelated in all applicable courses (see table 16). Thus, for the majority of schools in this study, general ability and specific skill level measures were equivalent in discriminating student achievement. This finding suggests that either ability measure could be used to select individuals to attend specific technical schools. However, an additional study effort would be required to substantiate this.

TABLE 16. SUMMARY OF CORRELATION COEFFICIENTS BETWEEN AFQT AND ASVAB SELECTOR COMPOSITE SCORES OF GRADUATES FROM EACH OF THE "A" SCHOOLS SAMPLED

	SP								CMI		GP								
	AK	DK	IM	MM-600	MM-1200	PN	TD	YN	AD	EN	AE	ASE	AW	EM	FTM	GMM	RM-SEA	RM-SH	SH
Correlation Coefficient (r)	.79	.80	.67	.56	.63	.88	.45	.21	.59	.46	.65	.45	.59	.57	.54	.76	.84	.83	.55
Sample Size (n)	240	108	17	360	201	74	165	211	451	352	86	30	42	337	72	47	487	388	176

NOTE: Magnitudes of correlation coefficients would be higher if attenuation in range was taken into account in the calculations. (There were no failures in our study sample since they were all graduates.) The correlation coefficients were not corrected for attenuation in range.

SECTION V

CONCLUSIONS AND RECOMMENDATIONS

This section contains the study conclusions together with recommendations for improving training effectiveness and training efficiency measurement.

CONCLUSIONS

As stated elsewhere in this report, the major objective of this study was to determine if the interrelationships among student ability, school performance, and fleet supervisor ratings observed across schools (TAEG 117) also occur at the individual course level. Another objective was to determine how two different measures of student ability (a general ability measure and a specific ability measure) were related to effectiveness/efficiency measures in particular individualized or conventional courses. Results presented in this report support the following conclusions for the courses studied.

1. The inverse relationship between general ability and training time (i.e., higher ability being associated with shorter training time) observed from the interschool analyses (TAEG 117) was confirmed by the intraschool analyses for the majority of individualized courses examined. Higher ability graduates completed training in less time than lower ability graduates in 8 of the 13 individualized courses. There was no significant relationship between ability and training time for the remaining five individualized courses.

2. The previous finding that longer training times were associated with higher ability graduates in conventional courses (TAEG 117) was not confirmed at the individual course level. Higher ability graduates completed their courses in the same amount of time as lower ability graduates within four of the five conventional courses that documented student remediation time.

3. Higher ability (both AFQT and ASVAB selector composite scores) is related to higher grades consistently within individualized courses, but inconsistently within conventional courses. Higher ability graduates received higher end-of-course grades in all of the seven individualized courses, but in only three of the seven conventional courses that provided grades. These findings substantiate the results of the interschool analyses conducted across individualized and conventional courses (TAEG 117).

4. Shorter training time is associated with higher grades within individualized and conventional courses. Graduates who spent less time in training received higher end-of-course grades than those with longer training times in six of the seven individualized courses, and in four of five conventional courses that documented student remediation time.

5. Only chance-level relationships were found between fleet supervisor ratings of school training adequacy and other available measures on school graduates. Specifically, for the courses examined, TAS ratings were not significantly related to end-of-course grades, time-to-complete training, graduate general ability levels, or graduate specific ability levels.

86

6. General ability (AFQT percentiles) and specific ability (ASVAB selector composite scores) predict training time and grades equally well for each of the II and CI courses studied. Neither general ability nor specific ability (except for one course) significantly predicted fleet supervisor (TAS) ratings. General ability and specific ability scores were highly intercorrelated in each of the II and CI courses sampled.

RECOMMENDATIONS

1. Determine if instructors in group-paced (GP) courses are tailoring course material to the lower ability students in class. If this is the case, then the full breadth and depth of training may be diminished. This, in turn, could adversely affect the motivation of the higher ability students. This recommendation is based on the lack of a clear relationship between ability measures and end-of-course grades for GP graduates.

2. A general statement of the purposes of collecting training feedback information from the fleet is contained in CNET Instruction 1540.3B. This general statement should be reviewed by the CNET and his functional commanders to ensure that all information desired to support the efficient accomplishment of the training mission is being obtained. From these general statements, specific purpose statements, that include specification of the kinds of decisions that will be made based on the data, should be developed. Validation of any instrument must be done with respect to the purpose of that instrument (Carmines & Zeller, 1979; Nunnally, 1978). Thus, the specific purposes for collecting training feedback must be specified before a training feedback instrument can be validated. Also, a training feedback instrument should be validated for each purpose for which it is used. If, for example, training feedback were to be used to provide information about the overall quality of a course, then the feedback instrument should be validated with respect to how well it measures the overall course quality. If, however, specific training-objective level information were desired, then the measure of each objective for each course would have to be validated separately. Additionally, if decisions based on training feedback were limited to triggering further investigations of particular problem areas, then the requirements for validity need not be as stringent as they would if corrective action (e.g., curriculum change) were to be taken based solely on the training feedback.

3. Assess the reliability and validity of training adequacy data obtained from current TAS questionnaire instruments. Validity should be assessed against the uses to be made of the data. Reliability and validity checks should be conducted on a continuous basis and not limited to one-time assessment. Data collection methods/techniques used should be justified on empirical grounds (Nunnally, 1978) and not on the basis of assumptions alone.

4. CNET should consider the desirability of requiring technical schools to document all training times required for student instruction (e.g., daytime contact hours, mandated night study, academic remediations, setback hours). Currently, academic remediation times are inconsistently recorded. This

provides a misleading picture of actual instruction time and may place the schools at a disadvantage in the event of curriculum change requirements or in adverse funding situations.

5. An effort should be initiated to examine the AFQT and ASVAB composite subtest scores of academically attrited students and graduates of "A" school. It may be that selection cutoff scores based on specific ASVAB subtests for each school may not be necessary. General ability (AFQT) scores may serve as adequate entrance criteria for all schools. This recommendation is based on the similarity of relationships (and high intercorrelations) between AFQT and ASVAB subtest scores with school measures.

REFERENCES

Bernardin, J. H. and Smith, P. C. "A Clarification of Some Issues Regarding the Development and Use of Behaviorally Anchored Rating Scales (BARS)." *Journal of Applied Psychology*, 1981, 66(4), pp. 458-463.

Borgatta, E. F. and Jackson, D. J. (Eds.) *Aggregate Data Analysis and Interpretation*. Beverly Hills, CA: Sage Publications, Inc., 1980.

Carmines, E. G. and Zeller, R. A. *Reliability and Validity Assessment*. Beverly Hills, CA: Sage Publications, Inc., 1979.

CNET Instruction 1540.3B. *NAVEDTRACOM Training Appraisal/Feedback System*, 2 June 1981. Chief of Naval Education and Training, Naval Air Station, Pensacola, FL 32508.

Cohen, J. and Coh[illegible]. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers, 1975.

Cronbach, L. J. and Snow, R. E. *Aptitudes and Instructional Methods*. NY: Irvington Publishers, Inc., 1977.

Ellis, J. A., Wulfeck, W. H., II, and Fredericks, P. S. *The Instructional Quality Inventory, II User's Manual*. Special Report A-24. August 1979. Navy Personnel Research and Development Center, San Diego, CA 92152.

Finn, J. D. *A General Model for Multivariate Analysis*. NY: Holt, Rinehart, and Winston, Inc., 1974.

Hall, E. R. and Freda, J. S. *A Comparison of Individualized and Conventional Instruction in Navy Technical Training*. TAEG Report No. 117. March 1982. Training Analysis and Evaluation Group, Orlando, FL 32813.

Lindman, H. R. *Analysis of Variance in Complex Experimental Designs*. San Francisco: W. H. Freeman, 1974.

Kim, J. O. and Kohout, F. J. "Multiple Regression Analysis: Subprogram Regression." In N. Nie, C. Hull, J. Jenkins, K. Steinbrenner, and D. Bent (Ed.). *Statistical Package for Social Sciences* (Second Edition). NY: McGraw-Hill Book Company, 1975.

Nunnally, J. *Psychometric Theory*. New York: McGraw-Hill, 1978.

APPENDIX A

ASVAB INFORMATION

This appendix describes the subtests comprising the Armed Services Vocational Aptitude Battery (ASVAB). It also provides the routines for converting ASVAB scores to Armed Forces Qualification Test (AFQT) percentiles. The AFQT percentiles were used as measures of general ability for the present TAEG study. The information presented in this appendix pertains to ASVAB usage prior to October 1980. The TAEG study sample of graduates was administered the pre-October 1980 ASVAB version. After October 1980, several changes were made to the item content and test score interpretation of the ASVAB. Various combinations/composites of subtest scores are also used to select individuals for specific school training. The composite cut-off scores used to select school graduates involved in the TAEG study are identified in appendix B.

TABLE A-1. ASVAB SUBTESTS[1,2]

SUBTEST	ABBREVIATION	DESCRIPTION
General Information	GI	A 15-item general knowledge test, primarily on sports, outdoor activities, automobile mechanics, and history. Testing time is 7 minutes.
Numerical Operations	NO	A 50-item speeded mathematical test, requiring elementary addition, subtraction, multiplication, and division--3 minutes.
Attention to Detail	AD	A 30-item speeded test in which the examinee counts the number of Cs embedded in lines of Os--5 minutes.
Word Knowledge	WK	A 30-item vocabulary test--10 minutes.
Arithmetic Reasoning	AR	A 20-item arithmetic test requiring examinees to solve word problems--20 minutes.
Space Perception	SP	A 20-item pictorial test. Requires examinee to select the three-dimensional figure that could be made from a flat pattern--12 minutes.
Mathematics Knowledge	MK	A 20-item test requiring knowledge of algebra, geometry, fractions, decimals, and exponents--20 minutes.
Electronics Information	EI	A 30-item test requiring knowledge of electrical and electronic components, principles, and symbols--15 minutes.
Mechanical Comprehension	MC	A 20-item test about drawings illustrating mechanical principles--15 minutes.
General Science	GS	A 20-item test measuring knowledge in the physical (N = 10) and biological (N = 10) sciences--8 minutes.
Shop Information	SI	A 20-item test on examinee's knowledge about the use of shop tools and practices--8 minutes.
Automotive Information	AI	A 20-item test on automobile parts, operations, or malfunctions--10 minutes.

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[1] Subtest scores are reported as Navy Standard Scores (NSS) with a mean of 50 and a standard deviation of 10 for an unrestricted recruit population.

[2] AFQT is computed by adding scores for WK, AR, and SP. The total is then converted to an AFQT percentile score.

TABLE A-2. PRE-OCTOBER 1980 AFQT CONVERSION: ASVAB FORMS 6 AND 7

The AFQT is computed by adding three raw component scores: WK+AR+SP. The resulting total raw score is then converted to an AFQT percentile score using the following conversion table.

Total Raw Score	AFQT Percentile Score
70	99
69	98
68	97
67	96
66	95
65	94
64	93
63	91
62	89
61	86
60	83
59	80
58	77
57	75
56	73
55	71
54	69
53	67
52	65
51	64
50	62
49	60
48	58
47	56
46	55
45	54
44	52
43	50
42	49
41	48
40	47
39	46
38	45
37	43
36	41
35	39
34	37
33	35
32	33
31	31
30	28
29	25
28	21 (Minimum required for enlistment)
27	19
26	16
25	13
24	11
23	10
22	8
21	7
20	6
18-19	5
16-17	4
14-15	3
12-13	2
0-11	1

ASVAB AFQT Scores	Mental Category
93 to 99	1
65 to 92	2
49 to 64	Upper 3 (3U)
31 to 48	Lower 3 (3L)
21 to 30	Upper 4 (4U)
10 to 20	Lower 4 (4L)

APPENDIX B

ASVAB SELECTOR COMPOSITE SUBTEST INFORMATION

This appendix presents ASVAB selector composite subtest information for the applicable schools included in the present study. The information is delineated by school course data processing (CDP) number, method of instruction (type), specific ASVAB selector composite subtest, and minimum cutoff score for entry into a specific school. The dates that the cutoffs were in effect for the sample of graduates in the present study are also given. For the present study, the composite scores were used to represent specific skill levels. Appendix E further identifies the schools examined. Appendix A provides a description of each of the ASVAB subtests.

TABLE B-1. ASVAB SELECTOR COMPOSITES

SCHOOL	CDP	TYPE	ASVAB SELECTOR COMPOSITE	CUTOFF SCORE	DATES IN EFFECT
AD	6501	CMI	AR+MK+EI+GS	193	3/76-10/80
AE	6515	GP	AR+MK+EI+GS	212	3/76-8/79
AK	6522	SP	WK+AR	105	3/76-10/80
ASE	6530	GP	WK+MC+SI	156	3/76-10/80
AW	6537	GP	WK-AR	110	3/76-10/80
DK	6061	SP	WK+AR	105	3/76-10/80
EM	6070	GP	WK+MC+SI	156	3/76-11/79
EN	6487	CMI	MK+AI	100	9/78-10/80
FTM	6027	GP	MK+EI+GS+AR	225	3/76-10/80
GMM	6115	GP	AR+MK+EI+GS	212	9/78-10/80
IM	6046	SP	WK+MC+SI	163	3/76-10/80
MM600	6493	SP	MK+AI	100	9/78-10/80
MM1200	6492	SP	MK+AI	100	9/78-10/80
PE Basics (EN)	6261	CMI	MK+AI	100	9/78-10/80
PE Basics (MM)	6262	CMI	MK+AI	100	9/78-10/80
PN	6102	SP	WK+AR	110	3/76-10/80
RM Basics	6144	CMI	WK+AR	100	3/76-10/80
RM-Sea	6380	GP	WK+AR	100	3/76-10/80
RM-Shore	6381	GP	WK+AR	100	3/76-10/80
SH	6477	GP	WK+AR	100	3/76-10/80
TD	6521	SP	MK+EI+GS	163	3/76-10/80
YN	6057	SP	WK+NO+AD	163	3/76-10/80

APPENDIX C

GENERIC TRAINING TASKS

This appendix presents a listing and description of generic training tasks used for training school subject matter experts to classify course learning objectives into the Instructional Quality Inventory (IQI) system. Material contained in table C-1 was adapted from Ellis, Wulfeck, and Fredericks (1979). See TAEG 117 for a detailed presentation of the IQI system.

TABLE C-1. INSTRUCTIONAL QUALITY INVENTORY CONTENT TYPES

Content Type is:	
Fact:	If the student must recall or recognize names, parts, locations, functions, dates, places, etc. Example: name the parts of the ---.
Category:	If the student must remember characteristics of similar objects, events, or ideas, OR if the student must sort or classify objects, events, or ideas according to characteristics. Example: identify target types from sonar signal displays.
Procedure:	If the student must remember a sequence of steps which apply to a single situation, OR if the student must apply the steps to a single piece of equipment or a single situation. Example: Field strip an M-16 rifle.
Rule:	If the student must remember a sequence of steps and decisions which apply in a variety of situations, OR if the student must apply the sequence across a variety of situations or types of equipment. Example: Use mathematical formulas such as Ohm's law.
Principle:	If the student must remember how or why things work the way they do, or cause-effect relationships, OR if the student must use his knowledge to explain how things work or predict effects from causes. Example: Based on knowledge of electronic theory, predict effect on the ______________ circuit if ----.

Source: Ellis, Wulfeck, & Fredericks (1979)

APPENDIX D

COST DATA

This appendix describes how training cost data were computed for use in the present study. A strategy for choosing among alternate training systems on cost and effectiveness bases is also described.

Training costs should include both complete investment and operating costs. Investment costs are "front-end" expenditures associated with such items as equipment, classroom buildings, curriculuum development. Operating costs are "ongoing," repetitive expenditures. They include items such as staff costs (e.g., pay, health, food), student costs (pay, health, food, time in school, rate), and travel.

In the Per Capita Course Costing Data Base maintained by the Chief of Naval Education and Training (CNET), many investment costs, such as facilities and curriculum development costs, are not included. The data base emphasizes operating costs which are primarily military pay and allowances (MPN) and operating and maintenance, Navy (O&MN) costs. MPN reflects military staff and student costs: O&MN costs account for civilian pay, some supplies, and travel. An "other" category is also used to classify miscellaneous items. Based on the cost data available for the schools in the present TAEG study, MPN accounted for approximately 74 percent, O&MN for approximately 26 percent, and "other" for less than 1 percent of total training costs.

The incremental costing model (System I)[1] was used with the CNET Per Capita Course Costing Data Base in the present TAEG study to calculate the total training costs to produce one graduate per average course session (based on FY-79 dollars). Costs to produce an individual graduate per specific course were computed by multiplying the average course cost to produce one graduate, by the ratio of a given student's time to complete the course to the average course completion time. This metric provided the variance required to use training costs as a criterion variable (see section III in the report concerning training costs for application of the metric in the analyses). However, since the full measure of resource and development costs[2] are not adequately stated in the data base, the results of training cost analyses should be viewed with caution.

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[1] W. M. Swope, Cynthia Yelvington, and J. M. Corey. Incremental Costing Model for Use with the CNET Per Capita Course Costing Data Base: System I. TAEG Report No. 77, November 1979. Training Analysis and Evaluation Group, Orlando, FL 32813 (AOAD81759).

[2] J. M. Corey. "The full measure of resource costs." Defense Management Journal, Third Quarter, 1980, 18-23.

The selection of appropriate variables and measures is important not only for training costs but also for training effectiveness. Figure D-1 presents a theoretical outcome matrix of possible decisions based on cost and effectiveness factors underlying the alternative systems/programs being compared. Full measures of costs and effectiveness are required to diminish the occurrence of dilemmas in choosing a cost-effective alternative.

		EFFECTIVENESS		
		LOWER	SAME	HIGHER
COST	HIGHER	NO	NO	?
	SAME	NO	EQUAL	YES
	LOWER	?	YES	YES

Figure D-1. Decision Outcome Matrix of Cost and Effectiveness Comparisons

The Decision Outcome Matrix shown considers two factors: cost and effectiveness. Each factor is gradated ordinally. Each matrix cell represents the joint outcome of a specified alternative system/program being compared to another on cost and effectiveness factors. It is assumed that decision outcomes can be obtained from at least an ordinal scale of measurement.

Note that out of the possible 9 outcomes, the two marked by a "?" suggest other areas of possible concern in cost and effectiveness comparisons. More factors may be taken into consideration when a highly effective system is the most costly alternative, or when a less effective system is the least costly. The joint outcome may be expressed as the desirability and/or certainty of selecting a specified alternative system/program. For example, system A costs less than, and is more effective than, system B. Thus, a desirable outcome of YES is indicated in the matrix for selecting A. However, if A costs more, as well as being more effective than B, then a "?" desirability is indicated.

One strategy, to prepare for all possible outcomes, is to use a *multi-variable, multi-measurement approach* to determine cost and effectiveness. The multi-variable aspect of this approach refers to an expansive effort to select those classes of measures that contribute totally or proportionately to the cost and/or to the effectiveness of the comparison systems/programs. Then, once the variables are selected, various measures can be employed to represent the same or different variables. This multi-measurement aspect increases the probability of observing a correlated pattern among the measures for all the variables used to reflect cost and effectiveness. Further analyses are conducted to determine the significance of obtained correlated patterns. The multi-variable, multi-measurement approach may also lessen the occurrence of "?" outcomes, if such outcomes are predominately influenced by an insufficient number of variables and/or measures selected.

APPENDIX E

COURSES INCLUDED IN THE STUDY

The full names and locations of the schools/courses examined during the study are presented in this appendix.

TABLE E-1. COURSES INCLUDED IN THE STUDY

SCHOOL/COURSE NAME	SYMBOL	LOCATION	METHOD OF INSTRUCTION
Radioman "A" Sea School	RM-SEA	San Diego, CA	GP[1]
Radioman "A" Shore School	RM-SHORE	San Diego, CA	GP[1]
Electrician's Mate "A" School	EM	Great Lakes, IL	GP
Engineman "A" School	EN	Great Lakes, IL	CMI[2]
Fire Control Technician, Missile "A" School Phase I	FT	Great Lakes, IL	GP
Gunner's Mate, Missile "A" School	GM	Great Lakes, IL	GP
Machinist's Mate 600 psi "A" School	MM600	Great Lakes, IL	SP[3,4]
Machinist's Mate 1200 psi "A" School	MM1200	Great Lakes, IL	SP[3,4]
Instrumentman "A" School	IM	Great Lakes, IL	SP
Aviation Support Equipment Technician Electrical "A1" Course	ASE	Millington, TN	GP
Aviation Machinist's Mate "A" School	AD	Millington, TN	CMI[5]
Aviation Electrician's Mate "A" School	AE	Millington, TN	GP
Aviation Anti-Submarine Warfare Operator "A" School	AW	Millington, TN	GP
Aviation Technician Training Deviceman "A" School	TD	Millington, TN	SP
Personnelman "A" School	PN	Meridian, MS	SP
Yeoman "A" School	YN	Meridian, MS	SP
Disbursing Clerk "A" School	DK	Meridian, MS	SP
Aviation Storekeeper "A" School	AK	Meridian, MS	SP
Ship's Serviceman "A" School	SH	Meridian, MS	GP

[1] CMI data from RM Basics obtained from CNTECHTRA (CDP 6144; 894 records).

[2] CMI data from PE Basics obtained from CNTECHTRA (CDP 6261; 359 records).

[3] CMI data from PE Basics obtained from CNTECHTRA (CDP 6262; 552 records).

[4] 1978 student training records obtained from National Archives via CNTECHTRA and PE School.

[5] CMI data obtained from CNTECHTRA.

APPENDIX F

STRUCTURED INTERVIEW QUESTIONNAIRE

This appendix contains a sample of the structured interview response sheet used to collect information from subject matter experts at the schools visited.

STRUCTURED INTERVIEW RESPONSE SHEET

Date of Interview________________________________

Name of School/Course____________________________

Location____

Purpose

1. What are the specific skills/knowledge taught in the course?

Organization

2. How long is the course? (days) Specify if fixed or average length.

3. How is the training content organized in the course? (e.g., lessons, modules, units, etc.).

4. What are the topic (subject) areas of each unit?

5. How long is each unit? Specify if fixed or varied during course.

6. Are the topic (subject) areas presented in a fixed (standard) order during training? If no, explain.

7. Does the course use the following kinds of instruction:

   a. Classroom Lecture

   b. Laboratory

   c. Self-paced Training

   d. CMI

   e. Other: ______

8. What type of training is given by each kind of instruction? (e.g., info/theory for lecture; hands-on practice in lab, etc.)

9. What are the approximate percentages of each kind of instruction (chosen above) used in the course?

10. What kinds of training media are used in the course?

11. Are certain media used with specific kinds of instruction? If so, specify the media-instruction match.

Performance Measures

12. How does the student progress (advance) during training?

    a. pass each lesson?

    b. hand in homework?

    c. pass lab exercises?

    d. other: ____________________

13. When is the student tested? (e.g., end of unit, final, etc.)

14. What kinds of tests are used in the course?

    a. paper-pencil: multiple-choice, essay, fill-in-the-blanks

    b. performance tests: lab/hands-on

    c. take-home/assignments/homework

    d. other: ____________________

15. How is the final course grade computed?

a. tests or time to completion?

b. summed across subjects, comprehensive final, or weighted proportion?

16. What is the grading scale used to compute the final grade? (e.g., 0-100, "UBAAAA," letters, time-to-completion, etc.)

17. What is the formula for computing the final grade?

18. How is class standing computed? Specify procedure (e.g., grades, time, etc.)

19. How are performance tests administered? (e.g., instructor, computer, etc.)

Administration

20. What are the prerequisite schools/courses for this school?

21. What are the accession patterns for this school (i.e., where do the Ss come from? (e.g., fleet, BE/E, RTC, etc.)

22. What is the average time between the student's arrival at the school and his/her starting the course (in days)?

23. Where do the students go upon completion of course (e.g., OJT, fleet, shore, C school, etc.)

24. What is the average time between the student's graduation and departure for his/her new duty station/next training command (in days)?

25. What are the remediation procedures? (define and detail)

26. What are the setback procedures? (define and detail)

27. Describe the role and function of the academic review board.

28. How is the student's time in the course computed? (e.g., days, hours; are holidays and weekends included?)

Attitude

29. Do you think that the kinds of instruction used in the course are effective in achieving the purpose of the course?

30. What is the consensus (majority opinion) of the staff regarding the effectiveness of individualized instruction (SP) in comparison to conventional, lock-step instruction (GP)?

APPENDIX G

STATISTICAL RESULTS OF REGRESSION ANALYSES

This appendix presents the statistical results of the regression analysis of data obtained from each of the 19 enlisted "A" schools and 3 basic courses. A relatively large number of tables are presented in this appendix. These are necessary to display adequately the study findings and to present the supporting statistical evidence for the many significant relationships observed among the variables of interest. All significant findings from the interschool analyses are summarized, however, at the beginning of the appendix. The statistical summary table identifies the significant results relative to a given criterion variable for each school.

In the main body of the appendix, schools are grouped under the method of instruction employed. The results are then presented for each course separately in order of the criterion variables examined; i.e., the measures of training effectiveness and training efficiency. For each criterion measure, tables are presented to summarize the significant results of overall regression analyses. Each summary table for a criterion measure identifies the predictors assessed and lists the regression coefficients (B) and F-ratios (F) obtained. The summary tables also show the degrees of freedom (DF) involved in specific comparisons and the magnitude of a particular R^2 increment. The numbers and letters listed under "step" in the summary tables refer to the order in which that particular set of predictor variables was entered into the regression equation. For each criterion variable, nonsignificant results are grouped together in one paragraph. Note that the purpose of the main effects analyses is to assess the contribution to criterion variance of one particular predictor variable (e.g., trainee ability). For the present study, the interpretation of significant main effects should be moderated by a significant interaction of that main effect with another predictor variable.

The contribution of Mr. Tim Whitten, student assistant at TAEG, is acknowledged for assistance in analyzing the data in this report.

SUMMARY OF FINDINGS

Table G-1 presents the summary of statistical results of the data from each of the 19 "A" schools and 3 basic courses. In this table, significant positive (+) and negative (-) relationships are depicted between respective criterion and predictor variables. Also provided are criterion-predictor relationships found to be nonsignificant (ns), or not applicable (NA) for statistical analysis. The four criterion variables presented in this table are: training time (TICOM), end of course grades (EOCG), training adequacy ratings (TAS) given by fleet supervisors, and ASVAB selector composite (COMP) scores.

INDIVIDUALIZED COURSES. Ten "A1" courses (eight self-paced (SP) and two computer-managed (CMI)) were analyzed that were taught under individualized instruction (II). Each course is identified below by name, symbol, and course data processing number (CDP). As appropriate, the data analyses of the courses are complemented by analyses of data of the respective basic (pre-"A") school courses.

Aviation Machinist's Mate (AD; 6501). Table G-2 presents significant results of the regression analyses on four criterion variables for the AD course. Significant and nonsignificant results are presented below.

Criterion: End-of-Course Grade. Three significant main effects resulted from this analysis.

General Ability Level. AD graduates with higher AFQT percentile scores received higher end-of-course grades than those with lower AFQT scores.

Time-to-Complete the Course. End-of-course grades were higher for AD graduates who took less time to complete the course than those who took a longer time to complete the course.

Specific Skill Level. AD graduates with higher ASVAB composite subtest scores received higher end-of-course grades than those with lower ASVAB scores.

Nonsignificant Results. The interactions of time-to-complete the course by AFQT and by ASVAB composite scores did not significantly predict end-of-course grades.

Criterion: TAS Ratings. One significant main effect resulted from this analysis.

End-of-Course Grades. AD graduates who received higher end-of-course grades were rated higher by their fleet supervisors on the job than those who received lower grades.

Nonsignificant Results. General ability level, specific skill level, time-to-complete the course, and their respective interactions did not significiantly predict end-of-course grades.

TABLE G-1. STATISTICAL SUMMARY OF REGRESSION ANALYSES

		METHODS OF INSTRUCTION/SCHOOLS																					
		SP								CMI					GP								
CRITERION	PREDICTORS	AK	DK	IM	MM-600	MM-1200	PN	TD	YN	AD	EN	PE-B EN	PE-B MM	RM-B	AE	ASE	AW	EM	FTM	GMM	RM-SEA	RM-SH	SH
TICOM	AFQT	ns	-	ns	-	-	ns	-	ns	-	ns	-	-	-	ns	NA	ns	ns	ns	-	NA	NA	NA
	COMP	ns	-	ns	-	-	ns	ns	ns	-	ns	-	-	-	ns	NA	ns	ns	ns	ns	NA	NA	NA
EOCG	AFQT	NA	+	+	+	+	NA	NA	NA	+	+	NA	+	NA	+	ns	ns	+	ns	+	NA	NA	ns
	COMP	NA	+	+	+	+	NA	NA	NA	+	+	NA	+	NA	+	+	ns	ns	+	ns	NA	NA	ns
	TICOM	NA	-	ns	-	-	NA	NA	NA	-	-	NA	-	NA	-	NA	-	ns	-	-	NA	NA	NA
TAS	AFQT	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	NA	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	COMP	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	NA	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	+
	TICOM	ns	ns	ns	ns	ns	ns	ns	-	ns	-	NA	ns	ns	ns	NA	ns	ns	ns	ns	NA	NA	NA
	EOCG	NA	ns	ns	+	ns	NA	NA	NA	+	+	NA	ns	NA	ns	ns	ns	+	ns	ns	NA	NA	ns
COMP	AFQT	+	+	+	+	+	+	+	+	+	+	NA	NA	NA	+	+	+	+	+	+	+	+	+

NOTES: 1. - = Significant negative relationship (higher scores on predictor variable associated with lower scores on criterion variable).
2. + = Significant positive relationship (higher scores on predictor variable associated with higher scores on criterion variable).
3. ns = Relationship between predictor and criterion variables found to be statistically nonsignificant.
4. NA = Data were not available (nor applicable) on which to perform an analysis.
5. No significant interactions among the predictor variables were found with any school included in the intraschool analyses.
6. Individualized courses are composed of self-paced (SP) and computer-managed instruction (CMI) courses. Conventional courses are group-paced (GP) courses.
7. TICOM = Training Time.
8. EOCG = End-of-Course Grades.
9. TAS = Training Appraisal System (Fleet Supervisor Ratings).
10. COMP = ASVAB selector composite score.
11. AFQT = Armed Forces Qualification Test percentile (general ability level).

Criterion: Time-to-Complete the Course. Two significant main effects resulted from this analysis.

General Ability Level. AD graduates with higher AFQT percentile scores finished the course in less time than those with lower AFQT scores.

Specific Skill Level. AD graduates with higher ASVAB composite subtest scores finished the course in less time than those with lower ASVAB scores.

Criterion: ASVAB Composite Subtest. One significant main effect resulted from this analysis.

General Ability Level. AD graduates with higher AFQT percentile scores had higher ASVAB composite scores than those with lower AFQT scores.

TABLE G-2. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE AD COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG[1]	1A	AFQT	.19	52.02	1/427	.1086	52.02	1/427
	2A	TICOM	-.17	133.42	1/426	.2126	100.79	2/426
	1B	COMP	.13	46.82	1/428	.0986	46.82	1/428
TAS[2]	2A	EOCG	.24	6.95	1/86	.0738	4.01	2/86
TICOM[3]	1A	AFQT	-.73	17.04	1/427	.0384	17.04	1/427
	1B	COMP	-.39	9.20	1/439	.0205	9.20	1/439
COMP[4]	1A	AFQT	.80	239.28	1/449	.3477	239.28	1/449

[1] EOCG = End-of-Course Grade
[2] TAS = Fleet Supervisor Training Appraisal System (TAS) Rating
[3] TICOM = Time-to-Complete the Course
[4] COMP = ASVAB Selector Composite Subtest Score for Entry into School

Aviation Storekeeper (AK; 6522). Table G-3 presents significant regression results of one criterion variable for the AK course. Significant and nonsignificant results are presented below.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other predictors were entered in this analysis.

General Ability Level. AK graduates with higher AFQT percentile scores also had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: Time-to-Complete the Course. General ability level and specific skill level did not significantly predict training time.

Criterion: TAS Ratings. General ability level, specific skill level, time-to-complete the course, and their respective interaction terms did not significantly predict fleet supervisor ratings.

TABLE G-3. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE AK COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
COMP	1A	AFQT	.50	400.23	1/238	.6271	400.23	1/238

Disbursing Clerk (DK; 6061). Significant regression results of three criterion variables for the DK course are presented in table G-4. Significant and nonsignificant results are described below.

Criterion: End-of-Course Grades. Three main effects resulted from this analysis.

General Ability Level. DK graduates with higher AFQT percentile scores received higher grades than those with lower AFQT scores.

Time-to-Complete the Course. DK graduates who took less time to complete the course received higher grades than those who took longer to complete the course.

Specific Skill Level. DK graduates with higher ASVAB composite subtest scores received higher grades than those with lower ASVAB scores.

Nonsignificant Results. The interactions of general ability or specific skill levels with time-to-complete the course did not significantly predict end-of-course grades.

Criterion: Time-to-Complete the Course. Two significant main effects resulted from this analysis. No other variables were entered into this analysis.

General Ability Level. DK graduates with higher AFQT percentile scores finished the course in less time than those with lower AFQT scores.

Specific Skill Level. DK graduates with higher ASVAB composite subtest scores finished the course in less time than those with lower ASVAB scores.

Criterion: ASVAB Composite Subtest. One significant main effect resulted from this analysis. No other predictors were entered into this analysis.

General Ability Level. DK graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: TAS Rating. General ability and specific skill levels, time-to-complete the course, end-of-course grades, and their respective interactions did not significantly predict TAS ratings.

TABLE G-4. SIGNIFICANT RESULTS FR[illegible] REGRESSION ANALYSES OF CRITERION VARIABLE[illegible]OR THE DK COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	1A	AFQT	.13	15.24	1/104	.1278	15.24	1/104
	2A	TICOM	- .03	11.48	1/103	.0874	14.13	2/103
	1B	COMP	.16	14.36	1/106	.1193	14.36	1/106
TICOM	1A	AFQT	- .94	7.89	1/104	.0705	7.89	1/104
	1B	COMP	-1.06	6.12	1/106	.0546	6.12	1/106
COMP	1A	AFQT	.61	193.79	1/106	.6464	193.79	1/106

Engineman (EN; 6487). Table G-5 presents significant regression results of three criterion variables for the EN course. Significant and nonsignificant results are presented below.

Criterion: End-of-Course Grades. Three significant main effects resulted from this analysis.

General Ability Level. EN graduates with higher AFQT percentile scores received higher end-of-course grades than those with lower AFQT scores.

Time-to-Complete the Course. EN graduates who completed the course in less time received higher grades than those who took longer to complete the course.

Specific Skill Level. EN graduates with higher ASVAB composite subtest scores received higher grades than those with lower ASVAB scores.

Nonsignificant Results. The interactions of general ability or specific skill levels with time-to-complete the course did not significantly predict end-of-course grades.

Criterion: TAS Rating. Two main effects resulted from this analysis.

Time-to-Complete the Course. EN graduates who finished the course in less time received higher ratings than those who took longer to complete the course.

End-of-Course Grades. EN graduates who received higher end-of-course grades were rated higher by their fleet supervisors than those who received lower grades.

Nonsignificant Results. General ability and specific skill levels, and their respective interactions with time-to-complete the course and end-of-course grades, did not significantly predict TAS ratings.

Criterion: ASVAB Composite Subtest. One significant main effect resulted from this analysis. No other predictors were entered into this analysis.

General Ability Level. EN graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: Time-to-Complete the Course. General ability and specific skill levels did not significantly predict time-to-complete the course.

TABLE G-5. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE EN COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	1A	AFQT	.11	10.92	1/228	.0457	10.92	1/228
	2A	TICOM	-.15	21.22	1/227	.0816	16.55	2/227
	1B	COMP	.17	12.79	1/228	.0531	12.79	1/228
TAS	2A	TICOM	-.92	4.15	1/114	.0350	2.14	2/114
	2B	EOCG	.02	6.50	1/114	.0538	3.31	2/114
COMP	1A	AFQT	.35	91.75	1/350	.2077	91.75	1/350

Propulsion Engineering Basics, Engineman (PE Basics-EN; 6261). EN students attend PE Basics before attending the EN "A" school. Table G-6 presents significant regression results of one criterion variable. Significant results are presented below.

Criterion: Time-to-Complete the Course. Two significant main effects resulted from this analysis. No other variables were entered into this analysis.

General Ability Level. PE Basics-EN graduates with higher AFQT percentile scores completed the course in less time than those with lower AFQT scores.

Specific Skill Level. PE Basics-EN graduates with higher ASVAB composite subtest scores completed the course in less time than those with lower ASVAB scores.

TABLE G-6. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE PE BASICS-EN COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
TICOM	1A	AFQT	- .55	23.04	1/349	.0619	23.04	1/349
	1B	COMP	- .81	29.51	1/343	.0792	29.51	1/343

Instrumentman (IM; 6046). Table G-7 presents significant regression results of two criterion variables. Significant and nonsignificant results are presented below.

Criterion: End-of-Course Grades. Two significant main effects resulted from this analysis.

General Ability Level. IM graduates with higher AFQT percentile scores received higher end-of-course grades than those with lower AFQT scores.

Specific Skill Level. IM graduates with higher ASVAB composite subtest scores received higher end-of-course grades than those with lower ASVAB scores.

Nonsignificant Results. Time to complete the course, and its interactions with general ability and specific skill levels, did not significantly predict end-of-course grades.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other predictors were entered into this analysis.

General Ability Level. IM graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: TAS Ratings. General ability level, specific skill levels, time-to-complete the course, end-of-course grades, and their respective interaction terms did not significantly predict TAS ratings.

Criterion: Time-to-Complete the Course. General ability level or specific skill levels did not significantly predict training time.

TABLE G-7. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE IM COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	1A	AFQT	.23	8.43	1/13	.3935	8.43	1/13
	1B	COMP	.35	16.48	1/13	.5590	16.48	1/13
COMP	1A	AFQT	.53	14.11	1/15	.4847	14.11	1/15

Machinist's Mate, 600 psi (MM600; 6493). Table G-8 presents significant regression results of four criterion variables. Significant and nonsignificant results are presented below.

Criterion: End-of-Course Grades. Three significant main effects resulted from this analysis.

General Ability Level. MM600 graduates with higher AFQT percentile scores received higher end-of-course grades than those with lower AFQT scores.

Time-to-Complete the Course. MM600 graduates who completed the course in less time received higher grades than those who took longer to complete the course.

Specific Skill Level. MM600 graduates with higher ASVAB composite subtest scores received higher end-of-course grades than those with lower ASVAB scores.

Nonsignificant Results. The interaction of general ability and specific skill levels with time-to-complete the course did not significantly predict end-of-course grades.

Criterion: TAS Ratings. Only one significant main effect resulted from this analysis.

End-of-Course Grades. MM600 graduates who received higher end-of-course grades were rated higher by their fleet supervisors on the job than those who received lower grades.

Nonsignificant Results. General ability level, specific skill level, time-to-complete the course, and their respective interactions (including the interaction with end-of-course grades) did not significantly predict TAS rating.

Criterion: Time-to-Complete the Course. Two significant main effects resulted from this analysis. No other variables were entered in this analysis.

General Ability Level. MM600 graduates with higher AFQT percentile scores finished the course in less time than those with lower AFQT scores.

Specific Skill Level. MM600 graduates with higher ASVAB composite subtest scores finished the course in less time than those with lower ASVAB scores.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other predictors were entered in this analysis.

General Ability Level. MM600 graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

TABLE G-8. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE MM600 COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	1A	AFQT	.15	90.52	1/271	.2504	90.52	1/271
	2A	TICOM	-.45	51.15	1/270	.1194	79.21	2/270
	1B	COMP	.20	70.12	1/270	.2062	70.12	1/270
TAS	2A	EOCG	.52	9.42	1/97	.0880	5.05	2/97
TICOM	1A	AFQT	-1.47	116.26	1/271	.3002	116.26	1/271
	1B	COMP	-1.94	86.25	1/272	.2408	86.25	1/272
COMP	1A	AFQT	.39	162.42	1/358	.3121	162.42	1/358

Machinist's Mate, 1200 psi (MM1200; 6492). Table G-9 presents significant regression results of three criterion variables. Significant and nonsignificant results are presented below.

Criterion: End-of-Course Grades. Three significant main effects resulted from this analysis.

General Ability Level. MM1200 graduates with higher AFQT percentile scores received higher end-of-course grades than those with lower AFQT scores.

Time-to-Complete the Course. MM1200 graduates who completed the course in less time received higher grades than those who took longer to complete the course.

Specific Skill Level. MM1200 graduates with higher ASVAB composite subtest scores received higher end-of-course grades than those with lower ASVAB scores.

Nonsignificant Results. The interaction of general ability and specific skill levels with time-to-complete the course did not significantly predict end-of-course grades.

Criterion: Time-to-Complete The Course: Two significant main effects resulted from this analysis. No other variables were entered in the analysis.

General Ability Level. MM1200 graduates with higher AFQT percentile scores finished the course in less time than those with lower AFQT scores.

Specific Skill Level. MM1200 graduates with higher ASVAB composite subtest scores finished the course in less time than those with lower ASVAB scores.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other predictors were entered in this analysis.

General Ability Level. MM1200 graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: TAS Ratings. General ability level, specific skill levels, time-to-complete the course, end-of-course grades, and their respective interactions did not significantly predict TAS ratings.

TABLE G-9. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE MM1200 COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	1A	AFQT	.17	149.38	1/170	.4672	149.38	1/170
	2A	TICOM	-.30	21.04	1/169	.0589	94.01	2/169
	1B	COMP	.18	65.53	1/171	.2771	65.53	1/171
TICOM	1A	AFQT	-1.55	102.68	1/170	.3766	102.68	1/170
	1B	COMP	-1.78	61.19	1/172	.2624	61.19	1/172
COMP	1A	AFQT	.45	129.65	1/199	.3945	129.65	1/199

Propulsion Engineering Basics, Machinist's Mate (PE-Basics-MM; 6262). MM graduates attended PE Basics before attending MM600 or MM1200 courses. Table G-10 presents significant regression results of three criterion variables. Significant and nonsignificant results are presented below.

Criterion: End-of-Course Grades. Three significant main effects resulted from this analysis.

General Ability Level. PE Basics-MM graduates with higher AFQT percentile scores received higher end-of-course grades than those with lower AFQT scores.

Time-to-Complete the Course. PE Basics-MM graduates who completed the course in less time received higher grades than those who took longer to complete the course.

Specific Skill Level. PE Basics-MM graduates with higher ASVAB composite subtest scores received higher end-of-course grades than those with lower ASVAB scores.

Nonsignificant Results. The interactions of general ability and specific skill levels with training time did not significantly predict end-of-course grades.

Criterion: Time-to-Complete the Course. Two significant main effects resulted from this analysis.

General Ability Level. PE Basics-MM graduates with higher AFQT percentile scores finished the course in less time than those with lower AFQT scores.

Specific Skill Level. PE Basics-MM graduates with higher ASVAB composite substest scores finished the course in less time than those with lower ASVAB scores.

Criterion: TAS Ratings. General ability level, specific skill level, time-to-complete the course, end-of-course grades, and their respective interactions did not significantly predict TAS ratings.

TABLE G-10. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE PE BASICS-MM COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	1A	AFQT	.14	210.88	1/456	.3162	210.88	1/456
	2A	TICOM	-.04	27.83	1/455	.0394	125.56	2/455
	1B	COMP	.18	121.08	1/445	.2139	121.08	1/445
TICOM	1A	AFQT	-.72	135.30	1/546	.1986	135.30	1/546
	1B	COMP	-1.05	135.77	1/530	.2039	135.77	1/530

Personnelman (PN; 6102). Table G-11 presents significant regression results of one criterion variable. Significant and nonsignificant results are presented below.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other predictors were entered in this analysis.

General Ability Level. PN graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: Time-to-Complete the Course. General ability level and specific skill level did not significantly predict training time.

Criterion: TAS Ratings. General ability level, specific skill level, time-to-complete the course, and their respective interaction terms did not significantly predict TAS ratings.

TABLE G-11. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE PN COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
COMP	1A	AFQT	.71	253.07	1/72	.7785	253.07	1/72

Training Device Repairman (TD; 6521). Table G-12 presents significant regression results of two criterion variables. Significant and nonsignificant results are presented below.

Criterion: Time-to-Complete the Course. Only one significant main effect resulted from this analysis.

General Ability Level. TD graduates with higher AFQT percentile scores finished the course in less time than those with lower AFQT scores.

Nonsignificant Results. Specific skill level did not significantly predict training time.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other predictors were entered in this analysis.

General Ability Level. TD graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: TAS Ratings. General ability and specific skill levels, time-to-complete the course, and their respective interactions, did not significantly predict TAS ratings.

TABLE G-12. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE TD COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
TICOM	1A	AFQT	-.38	7.01	1/162	.0415	7.01	1/162
COMP	1A	AFQT	.37	42.01	1/163	.2049	42.01	1/163

Yeoman (YN; 6057). Table G-13 presents significant regression results of two criterion variables. Significant and nonsignficant results are presented below.

Criterion: TAS Ratings. Only one significant main effect resulted from this analysis.

Time-to-Complete the Course. YN graduates who completed the course in less time received higher TAS ratings than those who took longer to complete the course.

Nonsignificant Results. General ability and specific skill levels, and their respective interactions with time-to-complete the course, did not significantly predict TAS ratings.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other predictors were entered in this analysis.

General Ability Level. YN graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: Time-to-Complete the Course. General ability level and specific skill level did not significantly predict training time.

TABLE G-13. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE YN COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
TAS	2B	TICOM	-.002	4.45	1/156	.0277	2.33	2/156
COMP	1A	AFQT	.16	9.31	1/209	.0426	9.31	1/209

CONVENTIONAL COURSES. The results of analyses on nine group-paced courses and one basic (pre-"A") school course are presented below.

Aviation Electrician's Mate (AE; 6515). Table G-14 presents significant regression results of two criterion variables. Significant and nonsignificant results are described below.

Criterion: End-of-Course Grades. Three significant main effects resulted from this analysis.

General Ability Level. AE graduates with higher AFQT percentile scores received higher end-of-course grades than those with lower AFQT scores.

Time-to-Complete the Course. AE graduates who finished the course in less time received higher grades than those who took longer to complete the course.

Specific Skill Level. AE graduates with higher ASVAB composite subtest scores received higher end-of-course grades than those with lower ASVAB scores.

Nonsignificant Results. The interactions of general ability and specific skill levels with training time did not significantly predict end-of-course grades.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other variables were entered in the analysis.

General Ability Level. AE graduates with higher AFQT percentiles had higher ASVAB composite subtest scores than those with lower AFQT percentile scores.

Criterion: Time-to-Complete the Course. General ability and specific skill levels did not significantly predict time-to-complete the course.

Criterion: TAS Ratings. General ability and specific skill levels, time-to-complete the course, end-of-course grades, and their respective interactions did not significantly predict TAS ratings.

TABLE G-14. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE AE COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	1A	AFQT	0.15	15.71	1/83	.1591	15.71	1/83
	2A	TICOM	-0.75	4.21	1/82	.0410	10.26	2/82
	1B	COMP	0.11	10.87	1/84	.1146	10.87	1/84
COMP	1A	AFQT	0.72	61.34	1/84	.4220	61.34	1/84

Aviation Support Equipment Technician (ASE; 6530). Table G-15 presents significant regression results of two criterion variables. Significant and nonsignificant results are presented below.

Criterion: End-of-Course Grades. Only one significant main effect resulted from this analysis.

Specific Skill Level. ASE graduates with higher ASVAB composite subtest scores received higher end-of-course grades than those with lower ASVAB scores.

Nonsignificant Results. General ability level did not significantly predict end-of-course grades.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other variables were entered in this analysis.

General Ability Level. ASE graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: TAS Ratings. General ability and specific skill levels, end-of-course grades, and their respective interactions did not significantly predict TAS ratings.

TABLE G-15. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE ASE COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	1A	COMP	0.31	14.33	1/28	.3385	14.33	1/28
COMP	1A	AFQT	0.35	7.13	1/28	.2029	7.13	1/28

Aviation Anti-Submarine Warfare Operator (AW; 6537). Table G-16 presents significant regression results of two criterion variables. Significant and nonsignificant results are described below.

Criterion: End-of-Course Grades. Only one significant main effect resulted from this analysis.

Time-to-Complete the Course. AW graduates who completed the course in less time received higher end-of-course grades than those who took longer to complete the course.

Nonsignificant Results. General ability and specific skill levels did not significantly predict end-of-course grades.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis.

General Ability Level. AW graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: Time-to-Complete the Course. General ability and specific skill levels did not significantly predict training time.

Criterion: TAS Ratings. General ability and specific skill levels, end-of-course grades, time-to-complete, and their respective interactions did not significantly predict TAS ratings.

TABLE G-16. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE AW COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	2A	TICOM	-.90	9.88	1/35	.2057	6.52	2/35
COMP	1A	AFQT	0.41	21.66	1/40	.3513	21.66	1/40

Electrician's Mate (EM; 6070). Table G-17 presents significant regression results of three criterion variables. Significant and nonsignificant results are described below.

Criterion: End-of-Course Grades. Only one significant main effect resulted from this analysis.

General Ability Level. EM graduates with higher AFQT percentile scores received higher end-of-course grades than those with lower AFQT scores.

Nonsignificant Results. Specific skill level, time-to-complete, and their respective interactions did not significantly predict end-of-course grades.

Criterion: TAS Ratings. Only one significant main effect resulted from this analysis.

End-of-Course Grades. EM graduates who received higher end-of-course grades were rated higher by their fleet supervisors than those who received lower grades.

Nonsignificant Results. General ability and specific skill levels, time-to-complete, and their respective interactions did not significantly predict TAS ratings.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other variables were entered in the analysis.

General Ability Level. EM graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: Time-to-Complete the Course. General ability and specific skill levels did not significantly predict time-to-complete the course.

TABLE G-17. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE EM COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	Overall F	DF
EOCG	1A	AFQT	0.93	21.29	1/285	.0695	21.29	1/285
TAS	2A	EOCG	0.02	10.89	1/225	.0462	5.46	2/225
COMP	1A	AFQT	0.70	164.91	1/335	.3299	164.91	1/335

Fire Control Technician, Missile (FTM; 6027). Table G-18 presents significant regression results of two criterion variables. Significant and nonsignificant results are described below.

Criterion: End-of-Course Grades. Two significant main effects resulted from this analysis.

Time-to-Complete the Course. FTM graduates who completed the course in less time received higher end-of-course grades than those who took longer to complete the course.

Specific Skill Level. FTM graduates with higher ASVAB composite subtest scores received higher grades than those with lower ASVAB scores.

Nonsignificant Results. General ability and the interactions of training time with general ability and specific skill levels did not significantly predict end-of-course grades.

Criterion: ASVAB Composite Subtest. Only one main effect resulted from the analysis.

General Ability Level. FTM graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: Time-to-Complete the Course. General ability and specific skill levels did not significantly predict training time.

Criterion: TAS Ratings. General ability and specific skill levels, end-of-course grades, time-to-complete the course, and their interactions did not significantly predict TAS ratings.

TABLE G-18. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE FTM COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	2A	TICOM	-0.45	17.02	1/62	.2099	9.54	2/62
	1B	COMP	0.17	10.15	1/62	.1406	10.15	1/62
COMP	1A	AFQT	0.39	28.21	1/70	.2872	28.21	1/70

Gunner's Mate, Missile (GMM; 6115). Table G-19 presents significant regression results of three criterion variables. Significant and nonsignificant results are described below.

Criterion: End-of-Course Grades. Two significant main effects resulted from this analysis.

General Ability Level. GMM graduates with higher AFQT percentile scores received higher end-of-course grades than those with lower AFQT scores.

Time-to-Complete the Course. GMM graduates who finished the course in less time received higher grades than those who took longer to complete the course.

Nonsignificant Results. Specific skill level and its interaction with training time did not significantly predict end-of-course grades.

Criterion: Time-to-Complete the Course. Only one significant main effect resulted from this analysis.

General Ability Level. GMM graduates with higher AFQT percentile scores finished the course in less time than those with lower AFQT scores.

Nonsignificant Results. Specific skill level did not significantly predict training time.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis.

General Ability Level. GMM graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: TAS Ratings. General ability and specific skill levels, time-to-complete the course, end-of-course grades, and their respective interactions did not significantly predict TAS ratings.

TABLE G-19. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE GMM COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
EOCG	1A	AFQT	0.15	10.39	1/45	.1875	10.39	1/45
	2A	TICOM	-.43	12.95	1/44	.1848	13.05	2/44
TICOM	1A	AFQT	-.12	4.96	1/45	.0994	4.96	1/45
COMP	1A	AFQT	0.77	61.54	1/45	.5776	61.54	1/45

Radioman, Sea (RM-SEA; 6380). Table G-20 presents significant regression results of one criterion variable. Significant and nonsignificant results are described below. No end-of-course grades were provided because student performance was based on a satisfactory/unsatisfactory rating.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis.

General Ability Level. RM-Sea graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: TAS Ratings. General ability and specific skill levels did not significantly predict TAS ratings.

TABLE G-20. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE RM-SEA COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
COMP	1A	AFQT	0.53	1172.77	1/485	.7074	1172.77	1/485

Radioman, Shore (RM-SHORE; 6381). Table G-21 presents significant regression results of one criterion variable. Significant and nonsignificant results are described below. No end-of-course grades were provided because student performance was based on a satisfactory/unsatisfactory rating.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other variables were entered in the analysis.

General Ability Level. RM-Shore graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: TAS Ratings. General ability and specific skill levels did not significantly predict TAS ratings.

TABLE G-21. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE RM-SHORE COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
COMP	1A	AFQT	0.54	846.37	1/386	.6868	846.37	1/386

Radioman, Basics (RM-BASICS; 6144). RM-Sea and RM-Shore students attend RM-basics before attending the RM "A" schools. Table G-22 presents significant regression results of one criterion variable. Significant and nonsignificant results are described below.

Criterion: Time-to-Complete the Course. Two significant main effects resulted from this analysis. No other variables were entered in the analysis.

General Ability Level. RM-Basic graduates with higher AFQT percentile scores finished their courses in less time than those with lower AFQT scores.

Specific Skill Level. RM-Basic graduates with higher ASVAB composite subtest scores finished the course in less time than those with lower ASVAB scores.

Criterion: TAS Ratings. General ability and specific skill levels, training time, and their respective interactions did not significantly predict TAS ratings.

TABLE G-22. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE RM-BASICS COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
TICOM	1A	AFQT	-1.30	29.42	1/883	.0323	29.42	1/883
	1B	COMP	-2.04	28.31	1/862	.0318	28.31	1/862

Ship's Serviceman (SH; 6477). Table G-23 presents significant results of two criterion variables. Significant and nonsignificant results are described below.

Criterion: TAS Ratings. Only one significant main effect resulted from this analysis.

Specific Skill Level. SH graduates with higher ASVAB composite subtest scores were rated higher by their fleet supervisors than those with lower ASVAB scores.

Nonsignificant Results. General ability level, end-of-course grades, and their respective interactions did not significantly predict TAS ratings.

Criterion: ASVAB Composite Subtest. Only one significant main effect resulted from this analysis. No other variables were entered in the analysis.

General Ability Level. SH graduates with higher AFQT percentile scores had higher ASVAB composite subtest scores than those with lower AFQT scores.

Criterion: End-of-Course Grades. General ability and specific skill levels did not significantly predict end-of-course grades.

TABLE G-23. SIGNIFICANT RESULTS FROM REGRESSION ANALYSES OF CRITERION VARIABLES FOR THE SH COURSE

CRITERION	STEP	PREDICTORS	B	F	DF	R^2 INCREMENT	OVERALL F	DF
TAS	1A	COMP	.02	7.10	1/127	.0530	7.10	1/127
COMP	1A	AFQT	.48	76.77	1/174	.3061	76.77	1/174

APPENDIX H

PARAMETRIC AND NONPARAMETRIC CORRELATIONS

This appendix presents parametric and nonparametric correlation coefficients between predictor and criterion variables for each of the schools sampled. The correlations are presented in two tables. Table H-1 shows Pearson's zero-order (parametric) correlations, and Kendall's tau and Spearman's rho (both nonparametric) correlations for each predictor-criterion relationship per school. Table H-2 summarizes the number of significant regression coefficients (based on table 14 in the text), and parametric and nonparametric correlation coefficients (from table H-1) per total number of coefficients obtained for each predictor-criterion relationship. Note that significant regression coefficients of a predictor-criterion relationship control for the confounding influences of other predictor variables; whereas zero-order parametric and nonparametric correlations do not.

The predictor/criterion variables listed in both tables are:

TICOM = Training time

EOCG = End-of-course grades

TAS = Training Appraisal System (Fleet Supervisor Ratings)

COMP = ASVAB selector composite score

AFQT = Armed Forces Qualification Test percentile (general ability level).

TABLE H-1. PARAMETRIC AND NONPARAMETRIC CORRELATIONS BETWEEN CRITERION AND PREDICTOR VARIABLES BY METHODS OF INSTRUCTION AND SCHOOLS

	SP								CMI					GP								
C:P	AK	DK	IM	MM-600	MM-1200	PN	TD	YN	AD	EN	PE-B EN	PE-B MM	RM-B	AE	ASE	AW	EM	FTM	GMM	RM-SEA	RM-SHORE	SH
TICOM: AFQT	-.08 -.06 -.09	-.28* -.15* -.21	-.45* -.36 -.47	-.53* -.32 -.44*	-.61* -.46 -.65*	.05 .06 .09	-.21* -.13* -.20*	-.14* -.08 -.11	-.20* -.15 -.22*	-.17* -.12* -.18*	-.25* -.18* -.27*	-.45* -.31 -.44*	-.18* -.14* -.21*	-.15 -.13 -.16	N/A N/A N/A	-.15 -.13 -.18	.04 .02 .03	-.24* -.18 -.24	-.32* -.23 -.28	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A
COMP	-.07 -.04 -.06	-.23* -.17* -.25*	-.40 -.35 -.44	-.49* -.31* -.43*	-.51* -.45* -.61*	-.01 .00 .00	-.09 -.09 -.13	-.04 -.02 -.02	-.14* -.15* -.21*	-.16* -.10* -.15*	-.28* -.24* -.35*	-.45* -.31* -.44*	-.18* -.14* -.21*	.03 .02 .02	N/A N/A N/A	-.17 -.19 -.22	.06 .07 .08	-.15 -.11 -.14	-.10 .04 .04	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A
EOCG: AFQT	N/A N/A N/A	.34* .19* .27*	.58* .39* .52*	.46* .32* .44*	.68* .49* .67*	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A	.33* .25* .26*	.23* .19* .28*	N/A N/A N/A	.56* .40* .55*	N/A N/A N/A	.34* .23* .35*	.28 .17 .21	.30 .20 .29	.24* .16* .23*	.16 .14 .19	.43* .16 .23	N/A N/A N/A	N/A N/A N/A	.12 .06 .08
COMP	N/A N/A N/A	.35* .23* .33*	.75* .60* .80*	.45* .30* .42*	.53* .39* .55*	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A	.32* .28* .41*	.24* .25* .36*	N/A N/A N/A	.46* .34* .47*	N/A N/A N/A	.34* .17* .25*	.58* .40* .55*	.27* .16 .21	.11* .13* .19*	.38* .21* .29*	.25* -.01 -.02	N/A N/A N/A	N/A N/A N/A	.12 .10* .15*
TICOM	N/A N/A N/A	-.37* -.23* -.33*	-.39 -.30 -.41*	-.57* -.40* -.54*	-.61* -.48* -.66*	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A	-.51* -.35* -.50*	-.31* -.23* -.34*	N/A N/A N/A	-.42* -.28* -.41*	N/A N/A N/A	-.22* -.18* -.23*	N/A N/A N/A	-.39* -.37* -.47*	-.03 -.08 -.10	-.48* -.46* -.61*	-.55* -.52* -.64*	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A
TAS: AFQT	.03 .03 .03	.11 .10 .15	-.43 -.32 -.46	.15* .11 .16	.00 .02 .02	.03 -.01 -.02	.04 .02 .01	.06 .06 .09	.12 .13 .18	.09 .04 .06	N/A N/A N/A	-.06 -.04 -.05	.05 .02 .03	-.18 -.08 -.10	-.18 -.24 -.33	-.18 -.17 -.21	.02 .02 .03	-.12 .00 -.03	.01 .13 .16	.00 .01 .01	.00 .00 .00	.13 .09 .13
COMP	.01 -.01 -.01	.11 .11 .15	-.09 .09 .16	.13 .09 .13	-.03 -.01 -.01	.03 -.01 -.01	.06 .04 .05	-.05 -.11 -.15	.17 .16* .22*	.14* .08 .11	N/A N/A N/A	-.02 -.02 -.03	.07* .03 .04	.20 .05 .06	-.15 -.17 -.25	-.04 .01 -.03	.06 .06 .10	-.26 -.07 -.12	-.24 -.22 -.30	.06 .02 .03	.03 .01 .02	.23* .13* .19*
TICOM	-.19* -.08 -.11	-.10 -.05 -.08	.18 .08 .12	-.19* -.11 -.15	.02 -.01 -.01	-.30* -.27* -.38*	.04 .04 .07	-.15* -.12* -.18*	-.02 -.05 -.05	-.17* -.04 -.05	N/A N/A N/A	-.04 -.01 -.02	-.04 -.01 -.01	.26 .18 .22	N/A N/A N/A	.08 .08 .09	.06 .06 .07	-.12 -.13 -.15	-.28 -.31 -.35	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A
EOCG	N/A N/A N/A	.12 .08 .10	.03 .09 .12	.24* .21* .28*	.05 .04 .06	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A	.28* .18* .26*	.21* .07 .09	N/A N/A N/A	.01 .02 .03	N/A N/A N/A	.06 .02 .01	.19 .13 .19	.01 .00 .01	.23* .13* .19*	.03 .11 .17	.18 .23 .34	N/A N/A N/A	N/A N/A N/A	.15* .09 .14
COMP: AFQT	.79* .61* .79*	.80* .66* .82*	.70* .54* .63*	.56* .36* .49*	.63* .49* .68*	.88* .71* .86*	.45* .34* .48*	.21* .13* .18*	.59* .50* .68*	.46* .34* .48*	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A	.65* .46* .62*	.45* .39* .53*	.59* .51* .66*	.57* .48* .66*	.54* .40* .54*	.76* .48* .65*	.84* .59* .75*	.83* .60* .77*	.55* .51* .66*

NOTES:
1. Top cell entry is Pearson's (r) zero-order (parametric) correlation.
2. Middle cell entry is Kendall's Tau (t) rank order (nonparametric) correlation.
3. Bottom cell entry is Spearman's Rho (rs) rank order (nonparametric) correlation.
4. Asterisk (*) denotes significant correlation ($p < .05$).
5. No asterisk denotes nonsignificant correlation ($p > .05$).
6. N/A - no data available for predictor or criterion variables.
7. SP - self-paced courses.
8. CMI - computer-managed instruction.
9. GP - group-paced courses.
10. C:P - correlation coefficients between the criterion (C) variable with each of the predictor (P) variables.

TABLE H-2. NUMBER OF SIGNIFICANT REGRESSION COEFFICIENTS, PARAMETRIC AND NONPARAMETRIC CORRELATIONS PER NUMBER OF APPLICABLE COURSES FOR EACH CRITERION-PREDICTOR RELATIONSHIP BY METHOD OF INSTRUCTION

		SP			CMI			GP			TOTAL		
CRIT	PRED	REG	PAR	NPAR	REG	PAR	NPAR	REG	PAR	NPAR	REG	PAR	NPAR
TICOM	AFQT	4/8	6/8	3/8	4/5	5/5	5/5	1/5	2/5	0/5	9/18	13/8	8/18
	COMP	3/8	3/8	3/8	4/5	5/5	5/5	0/5	0/5	0/5	7/18	8/18	8/18
EOCG	AFQT	4/4	4/4	4/4	3/3	3/3	3/3	3/7	3/7	2/7	10/14	10/14	9/14
	COMP	4/4	4/4	4/4	3/3	3/3	3/3	3/7	6/7	5/7	10/14	13/14	12/14
	TICOM	3/4	3/4	3/4	3/3	3/3	3/3	4/5	4/5	4/5	10/12	10/12	10/12
TAS	AFQT	0/8	1/8	0/8	0/4	0/4	0/4	0/9	0/9	0/9	0/21	1/21	0/21
	COMP	0/8	0/8	0/8	0/4	2/4	1/4	1/9	1/9	1/9	1/21	3/21	2/21
	TICOM	1/8	4/8	2/8	1/4	1/4	0/4	0/5	0/5	0/5	2/17	5/17	2/17
	EOCG	1/4	1/4	1/4	2/3	2/3	1/3	1/7	2/7	1/7	4/14	5/14	3/14
COMP	AFQT	8/8	8/8	8/8	2/2	2/2	2/2	9/9	9/9	9/9	19/19	19/19	19/19

NOTES:
1. CRIT = Criterion Variables
2. PRED = Predictor Variables
3. SP = Self-Paced Course
4. CMI = Computer-Managed Instructor Course
5. GP = Group-Paced Course
6. REG = Significant number of regression coefficients per total number (based on table 14 in text)
7. PAR = Significant number of parametric (r) correlation coefficients per total number
8. NPAR = Significant number of non-parametric (joint agreement of tau and rho coefficients) correlation coefficients per total number of pairs

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